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A Chance for the Locomotive Builders.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have lately had occasion to make a pretty extensive and careful study of motive power for suburban and interurban service, and the impression left on my mind is that the locomotive builders have not taken hold of this proposition as aggressively as their interests would seem to require. The electric fever seems to be running its course without opposition. It is now threatening to enter a field which will undoubtedly cut down the demand for locomotives engines, especially passenger engines, and, in view of the rather uncertain conditions attending the use of electricity, especially for long-distance transmission, locomotive builders, by turning their attention to the construction of a swift and comparatively noiseless motor, will offer the steam railroads a very acceptable solution of the difficulties which now confront them in meeting this character of competition. In conversation with the officers of one or two other roads, I find they are anxiously waiting for some development of this character.

A RAILROAD PRESIDENT.

DuBois' "Framed Structures."

NEW HAVEN, April 14.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue for April 2 a review of my "Framed Structures" appears, to some points of which I feel compelled to take exception.

First as to my use of the signs for bending moment "in a contrary sense to that of general custom."

It is the universal convention in mathematics to take angles positive when measured counter clock-wise. For the same reason, rotation and "moments" in analytical mechanics are positive when counter clock-wise. These conventions are universal, and it would seem proper to keep to them in all applications of mechanics. They are adhered to in fact in every application I know of, except in just this one subject.

After a student has acquired these conventions, it can only be regretted that "general custom" in this one subject only, should call upon him to reverse them. I have, therefore, conformed to them. Accordingly I make a right-end positive reaction cause a positive moment about any point on the left and compression in the upper chord. A left-end positive reaction causes a negative moment about any point on the right, and also gives compression in the upper chord. This is simple and in accord with the universal conventions of mathematics and analytical mechanics. If in this one subject it seems to anybody "unnatural to take the moment of the left reaction as negative," I can only say it seems to me a pity that such a state of mind should any longer continue or be encouraged. The conventions I have used are universal. It is confusing to shift them back and forth.

As to definition of the word "fixed," I have illustrated very thoroughly the meaning of fixed end, and can only say that in a teaching experience of 20 years I have never found a student who regarded it as a "mystery."

In the case of the roger truss referred to, in which, by the way, I have sought to illustrate "how not to do it," it is evident that if the figure were turned upside down, so that we have a load supported by three strings, the method and results would be beyond criticism. As it stands, the results are perfectly correct if we suppose the lower chord not to bend or sag. As I wished at the

same time to illustrate the method of least work and also its application to redundant members, and as the remarks which follow in the text seem so entirely in accord with the review, it would seem that extended criticism of such a passing illustration was somewhat unnecessary if not misleading.

As to the swing bridge, I would say that if my conclusions were really based upon a single calculation of a "truss of 160 ft. length with only four panels in each span and a depth of only 10 ft. at the pier," they would indeed be unworthy of confidence. Such a truss is certainly not a "fair practical case." I am in fact somewhat amazed that such an idea could have been gathered from my text. I have never tried to base any general conclusions upon special cases, much less upon unfair special cases. I have not done so in this instance. My conclusions are drawn directly from the general formulas themselves. These all reduce to the common formulas upon the concurrent assumptions of constant area of cross-section, constant depth and small panel length. The common formulas are indeed deduced upon just these assumptions, and hence come out as special cases of my general formulas, as they should, thereby confirming the accuracy of the general formulas themselves.

I simply illustrate the application of my general formulas by means of the truss referred to, which is taken in order to avoid tedious numerical computations. Incidentally I point out the difference due to the use of the common formulas in this special case. But my conclusions precede the example. They are not drawn from it, but simply illustrated by it.

This is the first application of least work to the subject that I know of, and I regard it as beyond question correct. It would be the work of less than 10 minutes for any one "following copy" to enlarge the formulas so as to include the bracing also. This I have done. But I found that the added terms disappear when the chords meet in a point at the ends, and can be neglected for practical cases of inclined upper chords. I have therefore omitted them. That there is thus a balance of errors in the common formulas, enabling them to apply without too much error to cases for which they were not really deduced, can only be regarded as a happy chance. It is luck, not "science."

As to the suspension system, here also is the first application of least work to the problem. I consider my treatment perfectly correct and the fullest which the subject has yet received. The way is, however, opened up, and any one who takes the standpoint of your reviewer can here also "follow copy" and obtain the corresponding results. Such a method of presentation would seem worthy of notice.

If your reviewer had taken the trouble, as I have done, to trust his idea, he would have found the fraction of the live load carried by the cable to come out equal to unity. In other words, when the cable is carrying all the dead load, if a live load is placed on the girder, the cable will carry all of that also. Such a result is evidently incorrect and the idea which leads to it must be erroneous.

In view of the preceding, I cannot help feeling that my work in this field is not properly estimated by the review in question.

A. J. DuBois.

[All books on stresses, except that of Professor Du Bois and a few German and French ones, regard rotation as positive when the direction is the same as that of the hands of a watch. We are surprised to learn that the opposite convention is "universal" in analytical mechanics; for our recollection of the works of Peck, Bartlett and Rankine is otherwise. On referring to Rankine's Applied Mechanics we find that he defines right-handed couples and right-handed rotation as positive, and surely no one can deny that this work is an authority on analytical mechanics.]

With regard to the word "fixed" our criticism related only to the equations used in finding the reactions of fixed beams by the method of least work. These equations contain nothing, implying that the beam is horizontally restrained at the end. For instance, the equation for the work of a beam given on page 308 applies to a simple beam supported at both ends just as much as to a beam fixed at one end and supported at the other. There is nothing in this algebraic reasoning which justifies the conclusion that the value found for the reaction belongs to the latter case.

With respect to the swing bridge it is not clear how the conclusion was arrived at if not by the comparison of particular cases. Winkler, Turneure and others have made numerical comparisons showing beyond all doubt that the common formulas do apply to most practical cases. This is certainly not the first discussion of swing bridges by the principal of least work, for one by Merriman will be found in our issue of Sept. 6, 1895. Further comment seems unnecessary regarding the triangular truss.

The first discussion of the suspension truss by the method of least work appears to have been published by Martin in a paper in *Engineering* in 1889. We have re-examined the investigations of Professor DuBois, and find it, in our judgment, to involve the most serious errors in the book. If the algebraic work be carried through, after making the proper corrections in equation (36), it will be seen that the unknown fraction cannot be found, it being mathe-

matically indeterminate. Such must indeed be the case, for the principle of least work cannot be applied to finding the stresses for a design whose sections are unknown. As a word of warning to those who imagine otherwise, a remark by Morison in his recent elaborate paper on suspension bridges is here most appropriate: "It is not possible to make a strain sheet in advance and then proportion the sections in accordance with the strains. Everything is determined by deflections, and deflections are themselves determined by sections."

The concluding paragraph of our review shows the high estimate we place on the labors of Professor DuBois. Our criticisms on his misapplications of the principle of least work were made in the interests of sound science and correct engineering practice.—
EDITOR RAILROAD GAZETTE.]

Sixteenth Street Crossing, Chicago.

Many have thought that the railroads interested would surely agree to the latest plan proposed for doing away with the grade crossing at Sixteenth street, in Chicago, and have expected that definite action would at last be taken. These were surprised when the Chicago & Western Indiana at the last moment refused to accept the new ordinance on the ground that the Chicago & Erie would lose yard room. This ordinance was drafted in accordance with plans prepared by the railroad engineers, and was passed by the Chicago City Council on March 9, with the understanding that the railroads had already agreed to it among themselves. The roads were given by the ordinance twenty days in which to file their acceptances. An important provision of the ordinance granted the South Side Elevated (the "Alley L") the right to erect and maintain an elevated structure in Harrison street to form a connection with the Union Loop, and the wording of the ordinance was such that in case the other railroads failed to accept, thus rendering it inoperative, the South Side Elevated could still retain its right to use Harrison street. In return it was required to raise its tracks to clear those of the St. Charles Air Line when brought up to its proposed grade.

A plan of this very complicated railroad crossing was published in the *Railroad Gazette*, April 24, 1891, which plan is sufficiently correct to show the general arrangement of the tracks at the present time. By the ordinance passed March 9, the tracks of the St. Charles Air Line were to be elevated to a point 22.25 ft. above city datum at Clark street, and were also to be shifted, making the new crossing 75 ft. south of its present location; this road was also to cross State street, Wabash avenue and Indiana avenue, lying east, at an elevation sufficient to permit of the building of suitable subways at these points. West of Clark street the Air Line was to descend, reaching and crossing the tracks of the Pittsburgh, Fort Wayne & Chicago R. R. at the present grade.

The Chicago, Rock Island & Pacific and the Lake Shore & Michigan Southern were required by the ordinance to raise their tracks beginning at a point north of Fourteenth street and reaching an elevation of 21.50 ft. above city datum at Clark street, thus crossing the St. Charles Air Line on the new grade; in the same manner the Chicago & Alton tracks were to be elevated so as to cross the St. Charles Air Line on the present grade.

The track of the Chicago & Western Indiana and the Aitchison, Topeka & Santa Fe were to be depressed at Clark and Sixteenth streets to a point 4 ft. above city datum, passing under those of the St. Charles Air Line, the Chicago, Rock Island & Pacific, the Lake Shore & Michigan Southern and the Chicago & Alton. Clark street with the electric street railroad was to be carried over the Chicago & Western Indiana and the Aitchison Topeka & Santa Fe by means of a viaduct.

There are so many railroads interested in any changes made at the Sixteenth street crossing that it has been a difficult matter to perfect a plan which would not put one or more of them at a disadvantage, and it was therefore no more than to be expected that the earlier efforts to bring those interested together failed because some roads were favored at the expense of others. The latest plan, as outlined above, divides the work very equally among all and while there would remain a few railroads crossing the St. Charles Air Line at grade, it would be a simple matter to protect these crossings by a system of interlocking signals, while the chief source of delay and danger, the crossing of Clark street at grade, would be entirely removed. The plan which has unfortunately been rejected presents a fair, practical solution of a most dangerous and complicated railroad problem. The fact that all the roads excepting the Chicago & Western Indiana formally agreed and accepted the ordinance throws the responsibility of delaying an important and needed improvement upon that road and it is not apparent what the road expects to gain by blocking a measure of so grave importance. It is held that the city of Chicago has the right to force the railroads to elevate their tracks at street crossings, but up to the present time the city and railroad officials have been able to agree on track elevation matters and little trouble or friction has occurred. It is now a matter of conjecture what will be the policy of the newly elected city officials and the new council, on matters pertaining to track elevation; therefore immediate action is hardly to be expected, but it is a problem which must eventually be settled and quite probably along the lines laid down in the ordinance passed on March 9,

The Proposed Improvement of the Erie Railroad Company's Terminal in Jersey City.

Before, during and after the elevation of the Erie Railroad tracks in Jersey City, many exploits in track-laying will be required. The work of elevation is to be carried on upon a narrow strip of property, on which the trains of the road must also run. First, must the main connections of the yard be made to suit the giving up of one side of this narrow strip of property to the trains, and the other side to the work of construction. Then, after a while, another extensive system of connections will be necessary, to enable the construction work and the traffic to change sides.

The General Yard Plan.—After all this will come the final arrangement of the yard, by connecting with and adding to track systems which have grown up previous to

is shown on the plan. But in case that elevating machinery be found unsuitable, the cars must then be pushed up an inclined plane and dumped directly into the pockets. A cross-section of such a coaling station is shown in Fig. 2. Owing to the shortness of the distance in which the inclined plane must be built, the pockets cannot be big enough to store more than two or three times the quantity of coal used by the locomotives in one day. With elevating machinery the capacity may be greater.

The Passenger Traffic.—To relieve the congestion at the train shed, the following described method of operation is proposed: To keep the smaller of the two car yards (Fig. 1) clear of cars, every morning, until 7:30 a. m. Have the trains which are to go westward, stand in the shed on tracks two and four, or on tracks one, two, three and four, or on tracks one, two, three, four, five and seven,

out and back them in, the car drafts would get out and in with less than half the number of movements required by the present plan. Moreover, the handling of the car draft in single trains would keep the passenger business out of interference with the drilling leads of the freight yard. The general effect of lessening the number of movements, getting out the interferences, and of so operating the double car yard that two or more movements may be made simultaneously and the cross-over not used in the morning rush hours will, it is thought, give the eight shed tracks a capacity—during the hours when needed—as great as could be obtained during the same hours with twelve shed tracks and the existing cross-over system of operation. After half-past nine in the morning and until the outward tide of travel begins in the afternoon, the south car yard will probably be full of cars. But in

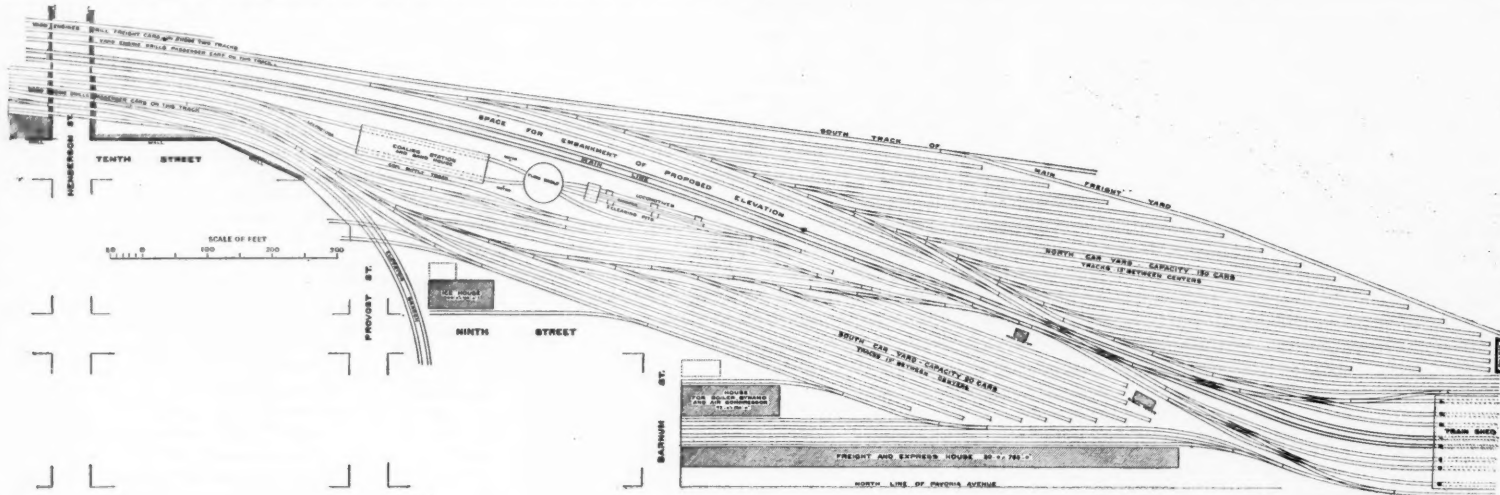


Fig. 1.—The Proposed Improvement of the Erie Railroad's Terminal in Jersey City.

and during the work of elevation. In view of this a general plan has been prepared, showing the proposed ultimate arrangement of the whole terminal yard, from the train shed to the Bergen tunnel; and this plan, after it shall be corrected and improved, is likely to serve as the ideal, or study of the ideal, which the company will strive to attain.

Among the changes proposed, a new location will be given to the main line, locomotive shops will be erected near the tunnel to replace the shops now at Provost street, and a local freight station built in Pavonia avenue—the present station between Henderson and Grove streets standing in way of the elevation and having to be removed. New coal pockets for the locomotives, several warehouses, an ice house and a building to contain the boilers, dynamo and air compressor, have also place upon the plan. And the track changes proposed are so extensive that the trackage of the yard will be nearly doubled, mostly with new systems of track.

A Possible Consequence of Elevating the Tracks.—If the elevation ever become an accomplished fact, the tracks at Henderson street, the most easterly street to be bridged over, will be some nine feet higher than at present. But Henderson street is crossed by the drilling leads of the main freight yard. To go down a steep incline, at this point, into the freight yard will require that all the main drilling of the yard must daily and hourly ascend this heavy adverse grade—a condition which may prove impracticable. The only alternative—and one likely to be forced upon the company as a consequence of carrying all the tracks over Henderson street—will be to raise the freight yard tracks so that they have a uniformly descending grade from the new elevation at Henderson street nearly all the way to the docks—a distance of some 2,000 ft. The result will be a gravity yard, similar to that of the Pennsylvania road, quite near at hand.

The Passenger Cars and the Locomotives.—In the train shed are only eight tracks. Here there are, for an hour or two in the morning, and again in the afternoon, more trains than arrive and depart during the same hours at the terminal of the Pennsylvania road or of the New York Central, in whose sheds are a dozen or more tracks. And with the Erie yard tracks as they now are, the work of moving the cars between shed and yard is of a kind to make gray hairs, so numerous are the cars, limited the sphere of action, and insistent the pace. Moreover, the locomotives, after bringing their train into the shed, follow the plan usual at most railway termini of moving about and producing interferences over a large part of the yard in getting ready to go out again on the road, and in running to and from their roundhouse or farm.

The Coaling Station.—Fig. 1 is that part of the general plan showing how it is intended to deal with the difficulties specified in the foregoing paragraph. On this plan it is seen that, in about an acre of space, but ample for their needs, and not readily available for any other purpose, the locomotives can clear their fires (over pits with moving scrapers and ash elevator), turn, get water, sand and coal, and proceed well on their way to a standing place, a few blocks west of Henderson street, without running on any track used except by the locomotives themselves. If coal elevating machinery be used, the coal supply cars will run down a grade, as

according to varying requirements at different hours of the day; and the incoming trains arrive on whatever other tracks are, at the time, vacant. The first train arriving after 7:30 a. m. would run in on one of the north outer tracks; the second arriving train on one of the south outer tracks; and so, except that more trains would then arrive on tracks one, three, five and seven than on tracks six and eight. The draft of empty cars could move from the south side of the shed to the south car yard, and from the north side of the shed to the north car yard, simultaneously with the arrival of a train on the other side. And any westbound train could depart while the draft is moving into either the north or the south car

this interval and during the night, there is no great frequency of trains; and the eight shed tracks will be found adequate even if all the car drafts must use the cross-over.

The Terminal at Large.—When as many trains arrive as depart every hour at a terminal station, and all are of the same class, each arrived train may, immediately, become a departing train, as is the case at the Battery Station of the elevated roads in New York, where an immense terminal business is conducted on two tracks for each line. But on the roads having long distance and suburban traffic the conditions are different, and no immediate disposition can be made of most of the arrived trains except to store them in car yards. And in getting these trains out of the shed, to make room for other trains to run in, it must be plain that by having a car yard on each side of the main line, a cross-over need not be frequently used; and that the plan of moving the draft and an arriving or a departing train simultaneously, requires fewer shed tracks than are needed with the usual one-side car yard system, in which the draft and the live trains cannot move at the same time, and it is further evident that these principles of operation are general in their application.

With 12 shed tracks a more symmetrical arrangement is possible than with eight. At nearly every railroad terminal there is room for a pair of each-side car yards, and 12 tracks in the shed. The outgoing trains might in every such case use four of the central tracks, in the morning, and eight in the afternoon; and the incoming trains, the eight outside tracks in the morning (four on each side); and the four outside tracks, in the afternoon (two on each side). By this system of operation with 12 shed tracks, many more trains could be handled than arrive and depart at any terminal station in or near New York.

Thus, at all events, say the Erie engineers, who, having sought, in vain, for examples of terminals, well worked out in all their details, have, in the plan presented herewith, attempted some contribution toward the solution of the tangled problem of dealing with the passenger traffic at the terminus of a railroad.

The Trans-Missouri Appeal.

The United States Supreme Court has been asked to grant a rehearing on the Trans-Missouri Freight Association case. The petition was presented by John F. Dillon, Counsel for the Union Pacific and the Missouri Pacific. He claims that the decision rendered March 22 leaves a doubt whether only the particular tariff agreement of March 15, 1889, is affected by it, or whether a general injunction is authorized against the 18 defendant companies forbidding them to violate the anti-trust law. The traffic agreement is ended, so that any injunction against that is a useless formality; while a general injunction, he claims, would be contrary not only to well-settled principles of equity jurisprudence, but to express provisions of the anti-trust act and of the constitution of the United States. There is no charge in the complaint of any threatened violation of the act upon which a prayer for relief can be founded, and it is a well-settled principle of equity that the prayer of a bill cannot enlarge the character or scope of the bill.

To issue a general injunction or any other sort of injunction, except against the particular agreement set forth in the bill of complaint, would be contrary to Sec.

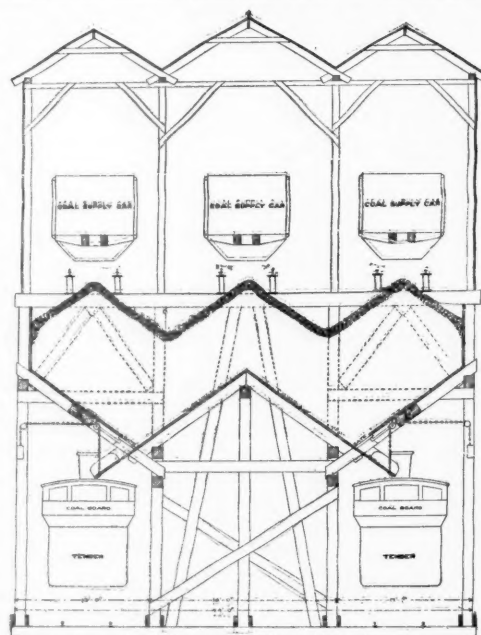


Fig. 2.—Section of Possible Coaling Stations for the Erie Railroad at Jersey City.

yard, there being thus, commonly, two movements going on at the same time, and sometimes three. By these means the arrived trains could be got quickly out of the way, so that only a few tracks would be required for all the incoming trains. They may have six of the eight tracks during the morning rush (every train running down to the buffers); and the departing trains, in the afternoon, may have six.

How the Passenger Engines Might Help.—With the track system as planned, it seems quite possible for the passenger locomotives, if sanding the track when running in, then, in backing out, to kick their trains into the car yards; and, perhaps, further possible for each locomotive moving toward the shed, to take out a westbound train, to be coupled in the yard to the train, and back it slowly down (about 1,500 ft.) into the shed, some 25 minutes before schedule time.

Were the road engines, as suggested, to kick the trains

4 of the Anti-Trust act which requires that the petition or an injunction shall "set forth the case" and requires the "hearing and determination of the case." A court is not authorized to issue a general injunction on a general duty of persons and corporations to obey the law, or to issue an injunction on any moot question presented merely in a prayer for relief.

It is claimed that there has been no "case" presented against the recent defendants, for the proceedings were without complaint, or answer, or proof, or hearing, or determination. If the statute is construed as authorizing the issue of a general injunction, it is contrary to Art. 3 of the Constitution, which expressly defines the jurisdiction of the courts as extending to "cases." The judges of the Supreme Court declined during Washington's administration to give their opinions on questions growing out of our treaties with France.

A general injunction in the present case, if issued, would settle nothing. To make it effective it would be necessary for the Court to hear and determine specifically just what acts have been committed: whether they were within the general purview of the injunction.

A general injunction would be void, moreover, under the fifth article of the Constitution, because it would undertake to deprive defendants of property without due process of law. The acts forbidden by the Anti-Trust act are misdemeanors, punishable by fine and imprisonment, and thus constitute a crime demanding trial by jury. A court of equity, without a jury, is incompetent to try crime.

When the Court was shown, as it was in this instance, that the agreement of March 15, 1889, was dissolved and ended and there was no allegation of a subsequent agreement or conspiracy, the bill should have been dismissed. The Court overlooked, it is claimed, also, the proceedings of Congress in enacting the statute under consideration. These show that Congress intended to apply the Anti-Trust provisions in the case of common carriers only to cases where the combination was for the purpose of raising rates of transportation above what is just and reasonable. If the statute applies to transportation by common carriers, its terms and provisions must be construed according to their common law meaning.

Finally, it is claimed the rehearing should be granted, to be had at the same time as the hearing of the joint traffic case; or at least the question of granting a rehearing should not be decided adversely till after the joint traffic case is heard. To do otherwise might work hardship and injustice to the defendants.

The Steel Arch at Niagara.

The engravings reproduced from photographs give a fair idea of some aspects of the great steel arch bridge now nearly completed at Niagara, but only a feeble conception of the bridge can be got from any picture. It must be seen on the spot in its massive simplicity, spanning the great gorge, and with the rapids tumbling beneath it, to get any real notion of its character, not only as an engineering structure, but as a piece of architectural design. The rugged simplicity, the solidity, the direct and sincere adaptation of the material to its uses grow upon one as he looks at the bridge from different points of view, and are the more impressive the more he sees them. It strikes one as the embodiment of the character of its designer.

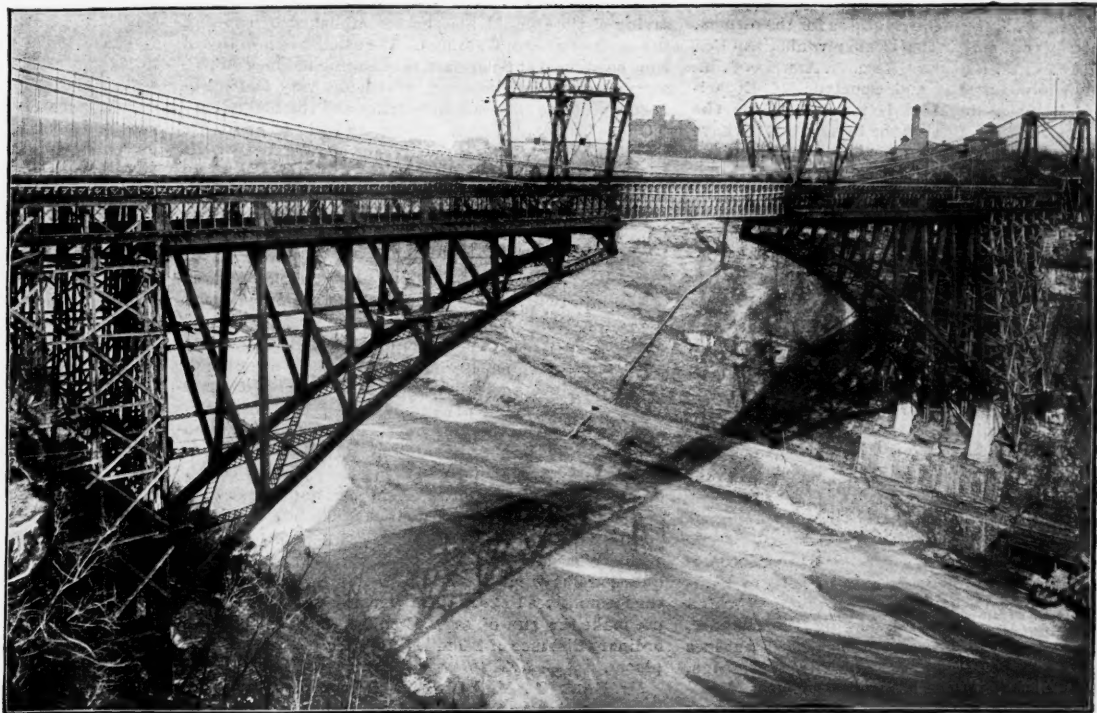
An article which we publish April 24, 1896, gave a very complete description of the bridge with illustrations in general and in considerable detail. Again, on Oct. 16 we showed the abutments, and on April 2 of this year we announced the closing of the arch which took place March 29. In what we have to say now some of the facts before published will be repeated. Of course the matter of greatest interest now is the method of erecting, but we are prevented from giving many particulars of that by the fact that Mr. R. S. Buck, the Resident Engineer, expects to prepare a paper for the American Society of Civil Engineers, giving in much detail the story of the bridge and its building.

As is now well known, this bridge is to take the place of the suspension bridge built by Roebling in 1855. In 1880 Mr. L. L. Buck replaced the wooden suspended superstructure of that bridge with steel, and in 1886 he rebuilt the towers in steel, replacing the stone towers. The bridge was, however, designed to carry but one railroad track, and in that particular was inadequate to the present traffic, even if it had not been too light for economical working of modern rolling stock. Consequently, the Grand Trunk Railway agreed with the companies owning the bridge for a perpetual lease of a new

bridge, the design of which was put in the hands of Mr. L. L. Buck, who has been for years engineer to the companies owning the suspension bridge. He had long believed that the proper form of bridge to span the gorge is an arch, both for engineering and æsthetic reasons, and it was his wish that the cantilever bridge, built some years ago near the suspension bridge, should be an arch, and naturally, the design for the new bridge took this form. Mr. Hobson, the Chief Engineer of the Grand Trunk Railway, required a bridge designed for very heavy loadings, and the result is that the new bridge is one of the heaviest for its span ever built. There are two railroad tracks on one deck, and the other deck will

six arms and it was designed to raise or lower the ends of the structure as might be necessary to make the adjustments in closing. It was found, in fact, that this was very readily done and that the structure could be easily controlled by the screws when the connection was actually made. The superintendent for the erecting company stood at the middle, and by signals back, transmitted by lines of men, could have the screws worked just as he wished, and the adjustment was easily made.

The total material in the new bridge will amount to nearly 7,000,000 lbs., and in the false works there are about 500,000 ft. of timber. The contract was let to



The 550-foot Steel Arch at Niagara.

Looking down stream—From the Cantilever Bridge.

carry a highway, a trolley track and sidewalks. The bridge is designed to carry on each railroad track a load of two locomotives with four drivers, 40,000 lbs. on each pair of drivers, followed by a train of 3,500 lbs. per foot, and in addition it is designed to carry a live load of 3,000 lbs. per foot on the lower floor, making 10,000 lbs. live load per running foot in all.

The bridge is not only massive in all its dimensions, but the lateral bracing is extraordinarily stiff. It is said that during the recent windstorm, when the velocity reported by the Weather Bureau was 72 miles an hour, an engineer of the Pennsylvania Steel Company crawled out and lay down on the end of the chord, which had then been carried out pretty well over the gorge, and hardly felt a tremor in the structure.

The arch span is 550 ft. between end pins. It is flanked by spans of 115 ft. on each end. These flanking spans were built on false works and the false works were carried up to take also the first panel of the arch. The arch

the Pennsylvania Steel Co., to build and erect the bridge, in May, 1896. Last September the field work was begun. The first steel casting for the skewbacks was lowered into place Dec. 18. Each of these is approximately 2 ft. x 16 ft. and weighs 23 tons. Jan. 26 the first piece of riveted steel was put in place. The arch was closed in two months, namely, March 29. The contract requires that the bridge shall be done, ready to turn over to the owners, June 15. It is not believed now that all of the work of building the new bridge and removing the old one will be completed at that time, but with good weather it is not impossible.

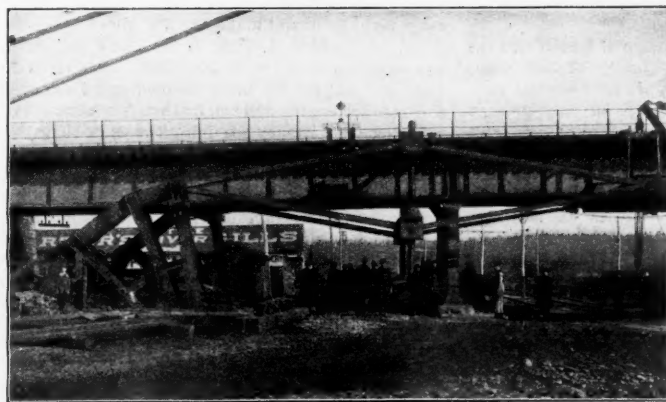
The field rivets amount in number to about 190,000 and some of this riveting is being done by two pneumatic riveters. The compressed air to supply these is generated on the American side and conveyed by pipes laid on the old structure. Machine riveting is not, however, an unqualified success even here. It is found to be a slow and awkward job to handle the riveters on the structure and there are many positions in which it is very inconvenient to work them.

We should not be surprised into learn that in the end a good many of the rivets will be driven by hand, perhaps, indeed, the larger part of them.

The material has been handled by two admirably designed steel travelers. Each of these consists of two steel bents braced together and carrying on the river end two steel booms, by means of which the arch members are swung in position. The heaviest of these members weigh about 30 tons. The material was handled on shore by hoisting engines, one of which is placed in each of the towers of the suspension bridge. These lifted it

from the yards where it had been delivered and loaded it on trolleys running on tracks laid on the brackets which will carry the sidewalks on the new structure, and thus it was run out to the front to be handled by the travelers. These travelers rest on the new structure and were advanced panel by panel as the structure was carried out.

When the arch and the approach spans are completed the superstructure of the old suspension bridge will be blocked up on the new structure, the new floor system built and the old one removed, the stiffening trusses of the suspension bridge will be taken away, and the cables will be removed. These cables weigh each probably about 170 tons and are perhaps 1,500 ft. long from



Adjusting Screw in Temporary Anchorage of Niagara Arch.

The Plate Girders are the Approach Span of the Suspension Bridge.

was then carried out cantilever fashion, being anchored back by heavy chains made of rough steel bars. These chains were carried back 250 ft. on the bluff, where they were curved 90 deg. down into the rock and embedded in concrete. At the outer end they were attached to the top chords of the approach spans by a single big pin for each chord, and the pull on the overhanging arm of the arch was carried through these chords. The extreme pull on each end was about 2,300,000 lbs., that is, 1,100,000 lbs. on each anchorage. In each chain was inserted the adjusting arrangement seen in one of the photographs. This is a diamond in which is a screw 9 1/4 in. in diameter and 17 ft. long. This screw is turned by a capstan at the lower end, having

anchorage to anchorage. Each cable is made up of seven strands, and it is proposed to remove the wrapping and then take the cables away strand by strand. Finally, the steeltowers will be taken down and the great Roebling suspension bridge, which has long been one of the remarkable works of the civil engineer, will be a mere matter of history, unless, indeed, it is rebuilt elsewhere. It is possible that a purchaser will be found for it, as it would be a cheap and excellent bridge for many years to come for highway and trolley use.

Mr. L. L. Buck, M. Am. Soc. C. E., is the Chief Engineer for the owning companies, and he is responsible for all of the designs of the new bridge, in general and in detail, from beginning to end. Mr. R. S. Buck, Assoc. M. Am. Soc. C. E., is Resident Engineer for the owners. The contracting company is the Pennsylvania Steel Co., of which Mr. J. V. W. Reynders, Assoc. M. Am. Soc. C. E., is Superintendent of Bridge and Construction Department. Of course Mr. Reynders is responsible for the design of the method of erecting the bridge, but we have not learned just who is the author of the ingenious method of adjustment. Very likely that is to be credited partly to Mr. L. L. Buck and partly to Mr. Reynders. Mr. F. W. Cohen, Assoc. M. Am. Soc. C. E., is Resident Engineer, and Mr. J. B. Fraim is Superintendent of Erection for the contractors.

Long and Short Locomotive Runs.

At the March meeting of the Western Railway Club there was an especially interesting discussion on the long locomotive runs. The extracts which follow give a pretty full report of the discussion.

WM. RENSRAW (Ill. Central R. R.): I am heartily in favor of long runs in both passenger and freight service, and where road divisions and time cards are arranged to permit it I consider that passenger engine runs should be about 250 miles, through freight runs 150 miles and local service 75 to 100 miles, the latter depending, of course, on the amount of local work to be done.

We have recently purchased several passenger locomotives, with cylinders 18x26 in. and drivers 75 in. in diameter, for the purpose of hauling fast passenger trains between Chicago and Centralia, making the distance, 252 miles, a continuous run, where heretofore engines were changed at Champaign, 128 miles from Chicago. We are also making runs of 235 miles between Vicksburg and New Orleans, and doubling on passenger runs of 135 miles, making 270 miles per engine per day.

With our latest and heaviest consolidation engines in freight train service we are obtaining 5,800 to 6,000 miles per month, and have no difficulty in keeping engines in condition to render proper service on the road.

All of our engines are run on a mileage basis—that is, they are expected to make a certain mileage between general repairs, barring accidents, and removing flues and cleaning boilers as often as necessary, and I find that the mileage can be greatly increased by long continuous runs or doubling without drawing fires, and that the necessity of removing flues between general repairs is less frequent than with short runs and consequent frequency of drawing the fires and refiring, and no doubt this same practice is beneficial to the firebox sheets, staybolts and all other parts affected in any way by expansion and contraction.

Data as to the economy of long runs as regards flues, fireboxes and staybolts are hard to get at, but there are many other items that may be figured on the right side of the ledger, such as cost of drawing fires, labor and fuel for refiring, re-oiling, cleaning, inspecting, turning and housing, etc., and then we must take into consideration the increased earning power of the locomotive, which represents so much capital invested.

Established road divisions, condition of power and endurance of enginemen, as well as quality of fuel used, are the only obstacles in the way of lengthening continuous runs to far beyond the limits of any present practice, and we are trying to overcome our part, and with the co-operation of other departments in arranging divisions, schedules, etc., feel confident of obtaining even better results than at present, and increasing the mileage and earning power of our engines at less cost for maintenance than at present.

ROBERT QUAYLE (C. & N. W. R'y.): While at first it might appear that all that seems necessary is for the motive-power department to give the command and the locomotive's continuous mileage will be increased, yet on some lines this cannot always be accomplished advantageously and economically.

Water tanks and coaling stations are located with the idea of only going from one terminal to another. Now, if you try to run beyond that point with half a tank of coal and probably a much less quantity of water, it will be found before going very far that a mistake has been made and the engine cannot get to the next water tank or coaling-station. Therefore, it is apparent that something more has to be accomplished before the command is given.

Another thing that sometimes operates against the lengthening of the divisions is the topography of road. The first 100 or more miles comprising the first division may be a dead level. The next 100 or more miles comprising the second division may consist of very heavy grades. The class of engine used to successfully pull the train over the first 100 miles might not be sufficient to haul it over the hilly division; hence we are compelled sometimes to do as we would not if things were otherwise.

If these difficulties are out of the way it will be seen

that advantages can be had by long runs. When an engine is fired up it might run 200 miles or more as well as 100. The building of one fire then takes the place of two, and 400 or 500 lbs. of unconsumed coal utilized to move freight instead of being thrown in the clinker pit and used for ballast.

If terminals can be extended so as to have two instead of three, one engine-house is dispensed with, together with its working force, including foreman, mechanics, laborers, etc., which in itself is a great saving. The life of the fireboxes, flues, etc., is lengthened because the contraction and expansion which is so severe on the firebox is lessened as the mileage is increased. Then, if this be true, less help is needed to maintain the boilers. A saving of time would also be accomplished by running the engines greater distances. The usual five minutes of time consumed at terminals in changing engines on passenger trains could be saved, which on very fast trains means much to the train dispatcher and the fuel pile.

On a freight train it means more if the runs are lengthened by cutting three divisions down to two. It not only means that engines are not changed so often, but freight trains are not switched from engine to caboose as is usually the case, which means from half an hour to several hours' delay, according to the class of engine. Switching means damage to the cars with the consequent added expense and trouble, and the number of break-in-tows outside of terminals caused by rough switching would be lessened on account of the longer division. Again, fewer terminals mean less sub-divisions, and consequently less yard-masters, switchmen, switch engineers and firemen, train-masters, train-dispatchers, clerical help, call boys, etc. My observation and experience on this line have convinced me that engines ought to be kept hot and in service as nearly continuously as possible. By so doing the business can be handled with a less number of engines and ought to be run so far as possible consistent with existing conditions on the line.

MR. WM. MCINTOSH (C. & N. W. Ry.): There is no question but that it would be better for the boilers of the locomotives to keep them warmed up. If they cannot make the run of, say, 200 miles, they can run the ordinary distance of 100 miles and then others take their places.

MR. BARR (C., M. & St. P.): I hope there are some transportation men here. I would like to know why we can couple an engine to a train and haul it 200 miles, whereas, if we change that engine at the end of 100 miles, the train has got to be switched.

There is another objection in connection with running 250 miles, besides what has been mentioned in the papers.

In competing for business we must consider the question of running through a division point. This has been a division point for the last 15 years, and was made a division point when the road did not run beyond it; and the first thing we know is, a whole delegation from that particular point comes to its office and says that if the change is made, they will give all their freight to the other road.

Railroads are hedged in in that way a great many times and prevented from doing what they really feel is to their own advantage. Aside from that, and it really seems as if that was the most active consideration today, I do not see why we cannot run the locomotives a couple of hundred miles—300 or 500 miles. We certainly can do it, and can do it with little clinking of the fire; but if we are doing so badly now, what is the reason that we spend the amount of labor that we do on these engines? Is there not a weak spot here? Why cannot an engine run 100 miles and couple to another train and come right back and make the 200 miles?

MR. MCKENZIE (N. Y., C. & St. L.): I do not believe any engine will run more than five hours on a freight train without the fire being cleaned, and I do not believe a passenger engine will run five hours without the grates being cleaned, if they are doing the work that they are supposed to do.

MR. COCKFIELD (C. & N. W. R.): We have passenger engines that are doubling this division, making 400 miles; they do not double it immediately, but they do so within a few hours. These passenger engines, with a fire that could keep, could, no doubt, be carried 200 miles farther. That may, however, sound like a pretty strong statement. An engine will come in after this 200-mile run not having more than 2 or 3 in. of fire and no unreasonable amount of clinker.

There was one point spoken of in the discussion to which I feel like taking a little exception, and that is the matter of holding the engine in fire. I have seen that advocated by a number of men. They have to. We cannot do this with the coal which we have in Iowa. You cannot keep an even fire all over the firebox without the engine blowing off more or less, and that is not a very great economy. It seems to me that it would be cheaper not to fire up the engine, or to put it in the house and fire it up when wanted, than to keep the fire burning. We have a great many cases where we have to hold engines 10 to 12 hours before we get them in the house, and we have a great many instances where engines come in that are leaking pretty freely, and I would like to know how to stop it.

MR. KINYON: I think that if an engine were properly cared for and the fire properly attended while the engine was standing outdoors, that there would be no trouble experienced from leaky tubes. I do not know much about leaks, not having seen a leak on the Milwaukee system within the last five years, but the only way that I am able

to explain leaks, and which I think is reasonable, is that the fire was neglected while the engine was standing out waiting to come in, and would be found low or dead at a point where the cold air could go through and reach the flues; consequently, unless the flues and sheet were in very good condition, it would cause a leak; but, as I said, I have not seen any leaky engines recently on the Milwaukee road, so I will not be able to speak with knowledge.

MR. MANCHESTER (C., M. & St. P.): If an engine starting out, knows fully that he has got to go 200 miles with that engine before it comes to a roundhouse, he commences right then and there to keep that engine in proper condition, so far as the fire is concerned, to go over that 200 miles successfully; and while we have got a good many runs between 150 and 200 miles that are being made now, I have no hesitation in saying that the engines are running on those longer runs in apparently as good condition as they are on the shorter runs.

MR. FULTZ (C., M. & St. P. Ry.): I do not favor 90-mile runs, of course; but when you get over 150 with single-track roads, it is impossible to get over the road in good time, and this is not very good for the men. After a man has been on the road 12 hours, you do not get the service from him that you do when he is on the road six or eight hours.

MR. LUTTRELL (Ill. Cent.): Mr. Manchester has the right idea on this subject. If an engineer starts out with the understanding that he has to run 200 miles, he commences at once to prepare himself for that long run, and I think the records on the Chesapeake & Ohio will show that the service was operated at less cost than it was before commencing the long runs. Of course, they have good fuel, which prevented delays caused by fires clinking near the completion of trips.

The Illinois Central officials are considering the matter of running their passenger engines from Chicago to Centralia, instead of turning in each direction from Champaign. At Champaign, under the present system, we handle 16 passenger engines per day. Now, by running these engines from Chicago to Centralia, it will not require any larger force at Chicago and Centralia than we now employ, as the number of engines handled would not be increased. The force necessary to care for the 16 engines at Champaign could be dispensed with. The only question we have to determine is whether the fuel we use is of fine enough quality to enable us to run through and keep the fires clean and to make steam enough. We first thought it possible that on the last 50 or 60 miles run the engines would not steam freely, and would cause a delay of the trains, although we have not determined that.

MR. RHODES (C., B. & Q.): I notice when the representative of the Milwaukee road spoke of having no flues leaking for the last five years, there was a general smile over the room, and I suppose it was a case of not believing. A friend of mine told me the other day that in stopping off at Milwaukee, he spoke to one of the officials in charge there, one of the sub-foremen, and in a discussion the foreman remarked that they never shopped an engine now with leaking tubes on the Milwaukee road. The Milwaukee road, a few years ago, was rather known among Western roads as having the worst water on the Western roads, obtaining its water all from wells, and yet here is a statement obtained by one of their men that they never shop engines for leaking flues.

Some years ago having perfected our arrangements in our short runs, we began to figure on how to get long runs, and to show what we have done, I would say that about 10 years ago our passenger equipment, in going through to Lincoln, Neb., had to make seven different engine changes. This is to say, that there are from start to finish eight terminals. The first change that we made was to reduce the eight terminals to five. A change, made about a year ago, has reduced those terminals now to four, and the distance is now Chicago to Burlington, about 207 miles; Burlington to Creston, 100 miles; from Creston to Lincoln, I think about 180 miles. There are now three engine changes and four terminals against seven engine changes 10 years ago. I do not believe that I need to say here, gentlemen, that the method of handling these passenger runs with the three engine changes in place of seven is much more economical.

We have one run that we feel a little proud of, a run from Rock Island to St. Louis. The distance from Rock Island to St. Louis is about 242½ miles. We used to have four engines in this run. Some little time ago there was need of more engines on the division, and the call was made for two additional engines that could not be supplied very readily. The master mechanic of the division said he believed he could supply these engines by making one engine do the Rock Island and St. Louis work. One engine now takes the train on the run from Rock Island to St. Louis, and return making that distance very 24 hours, 495 miles every day, and turning in at the end of the month a record of 14,850 miles. I believe this is one of the best passenger engine records that there is. Midway on the division at Beardstown, the train stops for dinner, 20 minutes, the engine backs up to the roundhouse, and the ashpan is cleaned, coal is taken and the engine returns to the depot. Here another crew gets on and takes the train to St. Louis and return to Beardstown, making the mid-point of the division the change point for the engineers, but the engine goes on as a steamboat goes on the ocean; it does not stop.

MR. MCINTOSH: Mr. Barr's suggestions are very good in regard to improving what we have, and in his former

remarks he spoke of breaking up the trains at terminals, asking "Why not let them go through?" I think a good deal can be done in that direction. In the first place, put the train in the station in order when it starts out from headquarters, and try to keep it in that condition. The ordinary custom is to change the caboose at each ter-

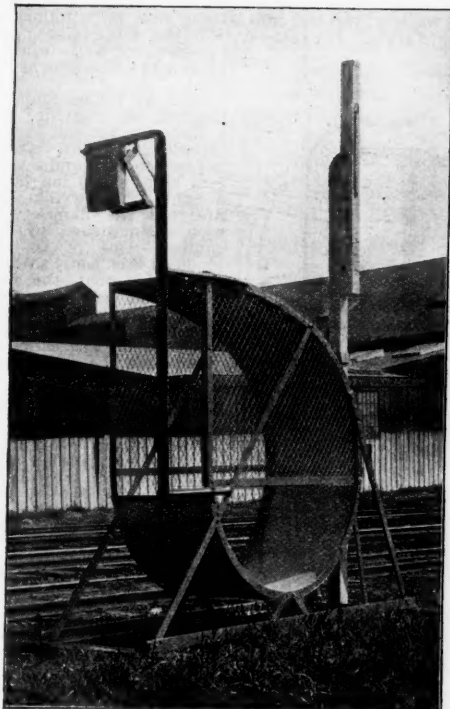


Fig. 1.—Ayars Mail Receiver.

minal. Why is it that the company looking for economy cannot run the caboose to the end of the line?

A word about cleaning the fire, or in regard to a dirty fire. We have been giving a good deal of attention to this on the divisions with which I am connected. We have found that proper attention by the enginemen will insure the fire going through in good condition. Our men are provided with suitable appliances for removing clinkers, and we have found that by watching them closely, and calling their attention to dirty fires, we have done away with most of the trouble of that kind.

Mr. BARR says why not turn the engine back again immediately? I would suppose it difficult to arrange the train schedule to do that, but I see no reason why it could not be done, so far as the engine is concerned. In busy seasons we send our engines over the road as often as three times during the 24 hours. In fact, we stop them long enough to coal up, and possibly clean out the fire, and keep them moving right along.

Mr. COCKFIELD: I will add a few words in regard to the changes in lengthening runs mentioned on the Iowa Division, recently introduced. About a year ago, we commenced running our time freight engines 200 miles, between Clinton and Boone. It operated very successful-



Fig. 2.—Ayars Mail-Car Crane.

ly; we do not seem to have any more trouble with our engines leaking than we did before. It was thought, as that worked so well, that we might run our dead freight trains in the same manner. Thirty days ago a schedule was put in effect with that end in view. The longest time scheduled on the road is 14 hours; the engines have made the time in seven hours and fifty-five minutes. One subdivision especially, the middle Iowa, of 86 miles, is very hilly. We found, in getting the engines over this division, that we had a great deal of trouble on account of the flues leaking, caused by the frequent cleaning of the fires, due to short runs. To

do away with this trouble, we concluded that we would run our engines through; we have done so, and thus far have had very good results. The engines, which were leaking at that time, leak in a measure with the present method of running them, but not to so great an extent. The results have been very encouraging, both in regard to utilizing the engines, and also in regard to economy by cutting out almost entirely the intermediate terminal, Belle Plaine. By this change we are saving there about \$1,200 a month.

Mr. DELANO (C, B. & Q.): Mr. Rhodes' allusion to the steamboat reminds me of something I heard recently in regard to marine practice, which I think may be of interest to members of our club. We sometimes come to think that we are making so much progress that we are the only ones doing so, and that we are doing it all. Until about six or eight years ago, the fastest steamers on the Atlantic were doubling the trip across in six weeks; that is, if they took a week to go across and a week to come back, they had two weeks' layover on each side. About four years ago, the White Star Line began doubling their steamers in four weeks; that gave them one week's lay-over on each side. I think it was two years ago that the American Line steamers did not have enough boats to operate in the manner of the White Star Line, and they adopted a scheme of doubling the Atlantic in three weeks, which gives them only three and one half days' lay-over at each end of the voyage, even if they make the trip on schedule time. Now, this is a trip of truly remarkable performance, and they have been enabled to keep that up for two years. As everyone knows, the service performed by those marine engines is very hard; indeed, the load is very variable, and, of course, they are running continuously from port to port. I think, therefore, that is a sort of marker for railroad men to show what can be done if they only try.

Mr. BARR: I object to bringing marine practice into comparison with locomotives. The idea of comparing with a machine that slips along on the water, and don't have any joints to come in contact with, is hardly right.

Mr. DELANO: In answer to what Mr. Barr said, I merely want to say this: If Mr. Barr has crossed the ocean and back again, and had the good luck to find no low joints, he has had better luck than I have. Another thing is, that I am aware that marine-engine practice is not, perhaps, a fair comparison; at the same time rail-



Fig. 3.



Fig. 4.

Tripping Device.

road engineers have learned a great deal from marine-engine practice. Certainly, our adoption of the compound system and a very much higher steam-pressure has been due to following the lead of marine-engine practice.

Mr. HERR (North. Pac.): I feel very strongly that there are important economies in running engines long distances without breaking the run. The point just raised by Mr. Manchester is one worth considering, for our schedules are often not such that an engine can be turned quickly, and, therefore, we cannot get the large amount of mileage which might be possible if we could turn engines with a minimum time; but we can get that mileage when we do start an engine if we go a long distance. Another important economy is obtained where you have terminals every 100 miles, and turn engines around. You will have the terminal expenses of one-half the amount when running 200 miles. You would simply have your terminal charges cut in two, and that, with us, is a very important economy.

I think, with Western coal, the matter of cleaning fires is also an important economy. The fewer times you can clean the fires in an engine the better results you will get with your fireboxes and flues. In some of the Western roads, where they can turn them quickly, they are obtaining better results than they used to do when raking the fire out of the box and putting the engine in the roundhouse, and then firing up again. I feel that this is a very important matter for all of us to consider, and there are pros and cons on both sides of the question; but the weight of the argument, I believe, lies in the direction of the greater economies in longer runs for our locomotives.

Mr. PETERSON: There is one point that has not been touched upon, and that is the matter of engineers reporting the work. It is not very often that an engineer, coming into a terminal, whether 40 or 150 miles, does not have something to report. He wants some work done, and wants it very much, and if you place that engine in the roundhouse, you have to do the work, even though you know it is not absolutely necessary. We have 16 engines more to do the work on now than we had previous to the change, on account of the long runs. That does away with one terminal. We have not added another man; we have not added another dollar to the pay-roll to take care of those engines.

The Ayars Mail Receiver.

The accompanying illustrations show the latest designs of Ayars' mail catcher and deliverer, made by the Ayars Mail Catcher Co., of Chester, Pa. This device was tried last year on the Philadelphia, Wilmington & Baltimore, with great satisfaction, and has been approved by the Post Office Department. It has been patented by Mr. B. D. Ayars, Jr. In many instances in these experiments the trains ran faster than 60 miles an hour,



Fig. 5.—Car with Two Cranes.

and the stations were less than one mile apart, but the action of the apparatus was entirely satisfactory.

Fig. 1 shows the iron receiver, lately designed, which is regarded as more efficient and durable, while presenting a better appearance than the wooden receiver used in the early experiments. This receiver is 2 ft. 8 in. wide, 7 ft. 5 in. high and 5 ft. 9 in. in length. The frame and braces are of angle iron and the covering of the top, back and bottom is sheet iron $\frac{1}{2}$ -in. thick. The side next the track is entirely covered by the iron wire netting shown. The wooden tripping pieces, suspended from the horizontal arm at the top, actuate a trip on the car, detaching the bag or bags ready to be delivered, which pass into the receiver. The circular form of the receiver destroys the momentum of the mass, thus insuring delivery of the mail with the least possible liability to damage.

The tripping pieces, after a delivery, fall back into position by gravity, so that the receiver is always ready for a train. The size of the receiver is sufficient to take any number or weight of bags that can be hung from a car-crane, and with two cars, with two doors each, the bags from all four—say 12 bags in all—can be delivered successively at any speed.

It will be observed that the construction of the receiver is simple, and, the tripping bars being of wood, the whole operation of delivering the bags is accomplished without violent contact of metal with metal. The mail clerk does not have to reach outside of the car, placing himself in a dangerous position, in order to attach bags to the crane, nor does he have to bear down on the arm after it is loaded in order to keep the bags in place until they are detached. The arm projecting out from the car is so constructed that at no time can there be any shock to the attendant. Pouches require no straps or other additional appurtenances to fit them for attachment to the crane.

The crane for delivering bags to a train is of the same pattern as that in common use.

Fig. 2 shows a bag on a car ready to be delivered. The construction of the tripping device is shown in Figs. 3 and 4. The lock at the bottom falls from the position shown in Fig. 3 to that in Fig. 4, by gravity. The lever at the top is held in an upright position by a coiled wire spring.

Fig. 5 shows a car equipped with two delivery cranes, one for use in each direction. This arrangement is for single track roads where receivers are located on one side of the track only.

Cars for China.

We have received from Shanghai specifications issued under date of Feb. 26 for certain freight and passenger cars to be supplied for the Imperial Chinese Railway administration for the Sung-Wu Railway. According to the specifications bids are to be received by Mr. H. Hildebrand, office of the Sung-Wu Railway, Temple of Heaven, North Honan road, Shanghai, until April 18; but we learn that inasmuch as several American concerns wish to bid, the time of receiving tenders will be extended.

In all 26 cars are called for. Of these four are first and second-class combined carriages, six are third-class carriages, two are luggage cars, two are small lowries for transportation of material along the line, and the rest are freight cars of various sorts. All of them are four-wheeled cars with rigid axles. They are to be built to 4 ft. 8 $\frac{1}{2}$ in. gauge and the heaviest load permitted is 14 tons on one pair of wheels. They are to be provided with "Janney patent central couplings fitting to Imperial Chinese Railway standards," and the passenger cars are to have side

buffers. The frames are to be of iron throughout, and all material must be of first quality and equal to the best materials prescribed by German and English boards. The axles and wheels especially must be of the highest class material, and the contractors will be held responsible for the quality of material for one year after delivery.

The passenger carriages are to have the non-automatic Hardy brake, also a hand brake. A second offer is to be made in case the Westinghouse brake is specified instead of the Hardy. The lighting is to be by oil lamps in the roof, and a low-pressure steam heating system must be provided. The carriages are to have longitudinal aisles, like the American practice, and also clear stories. The luggage van must have a seat for the guard arranged to such a height as to enable him to overlook the train, also a dog compartment and a chest fitted with surgical appliances.

The freight cars must be of 15-tons capacity. They are to have side doors and a specified proportion of them must be fitted with hand brakes and with brakemen's box.

This material is to be delivered in China, and one-third of the contract price will be paid when the contract is signed, the rest after the rolling stock has been tried and accepted, this latter to be, however, not later than four weeks after delivery. In the bids a statement must be made of the shortest possible time in which the various classes of cars can be delivered, and for each week's delay of each car after the agreed time there will be a penalty of £2.

The Kindl Metal Truck for 100,000 Pounds Capacity Cars.

The various metal car trucks which have been brought out within the last few years differ from each other principally in the construction of the side frames, which difference necessarily makes the joining of the truck transom to the frames a special problem in each case.

In the majority of trucks the side frames are plates, either built up or flanged, but in some recent designs there is a tendency toward the use of commercial rolled shapes, and in this respect the truck shown by the accompanying engravings presents some new and interesting features.

The truck illustrated was designed by Mr. F. H. Kindl, Structural Engineer of the Carnegie Steel Co., for use under the 100,000-lbs. capacity steel cars now being built for the Pittsburgh, Bessemer & Lake Erie. Fifty of these cars will be equipped with the Kindl trucks.

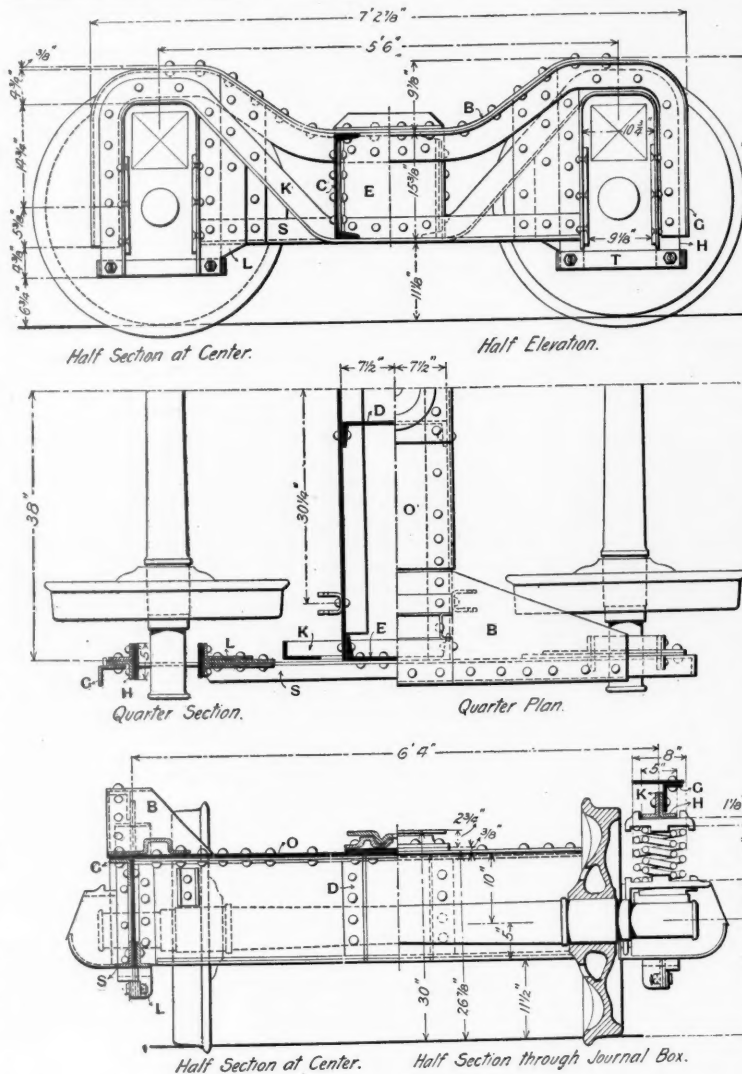
The fundamental feature of the side frame of this truck is a truss having for its members angles and plates united by rivets. The principal parts of each side frame are the angle *G*, which forms the upper and end sections, the lower angle *S* which corresponds to the usual tie bar of the ordinary diamond truck frame and the inverted angle *K* joining the upper and lower members and forming, with the angles *H* and *L*, the pedestals.

The truck transom consists of two 15-in. 33 lb. steel channels 6 ft. 4 1/4 in. long, stiffened on the top flanges by a riveted cover plate *O* and also held together by the two separators *D* on either side of the center, and the separators *E* at either end. These separators are short pieces of channel of the same depth and weight as the transom channels.

The connection between the side frame and the transom channels is made by means of a gusset plate *B*, riveted to the top arch bar of the truss and to the top flanges of the channels. Also the ends of the transom channels are inserted between the upper and lower members of the side frame, while the separators *E* are

of the parts, the number of pieces and the dimensions and weight of the material. The total net weight of the truck proper is 2,083 lbs.

It will be noticed that the design is simplified by the use of angles for the side frames which are readily bent into required shapes, and through the openings in the frames the parts can be inspected. Another important feature is that the stresses in all the members are easily determined and the design is very flexible in that



The Kindl Steel Truck for 100,000 Lbs Capacity Cars.

changes can be readily made to suit variations in the wheel base, while the weight of the truck can be made suitable to any capacity car by increasing or decreasing the size of the angles.

An advantage possessed by a truck built up of commercial rolled shapes is that the material can be purchased in the open market and any well-equipped bridge or structural works and many car shops are now fitted for building the trucks. We are advised that the rivet work on the trucks for the Pittsburgh, Bes-

train broke in two and the rear portion afterward ran into the forward one, wrecking 3 cars. The conductor was injured.

5th, 4 a. m., on Flint & Pere Marquette, near Northville, Mich., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking 8 cars. A tramp was injured.

5th, on Baltimore & Ohio Southwestern, near Hill's, O., a passenger train which had been stopped on account of a washout was run into at the rear by a following freight train. The rear car, a sleeper, was damaged and 4 passengers were injured. There was a dense fog at the time.

10th, on Philadelphia & Reading, at Danville, Pa., a freight train ran into a preceding freight, wrecking two engines and several cars, all of which fell down a bank. The wreck took fire, but the flames were soon extinguished by fire engines. One of the engine men was badly scalded. It appears that the foremost train had been accidentally stopped and a flagman had been sent back, but that he was called in just before the collision occurred.

22d, 11 p. m., on Cleveland, Cincinnati, Chicago & St. Louis, near Springfield, O., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking 27 cars. Four tramps were injured.

22d, 3 a. m., on Union Pacific, at Green River, Wyo., a passenger train ran into the rear of a preceding freight, badly damaging 9 cars. The freight conductor, one brakeman and one passenger were injured.

23d, on Pennsylvania road, at Sang Hollow, Pa., a freight train ran into the rear of a preceding freight, and the engine fell into the Conemaugh River. The engine man jumped off and was injured. It is said that the foremost train was suddenly stopped by the rupture of an air-brake hose, and that the flagman was so severely shocked by the stoppage that he could not flag the following train in season.

23d, 8 p. m., on Boston & Maine, at Chicopee, Mass., a passenger train ran into some freight cars which had run out upon the main track from a siding, making a bad wreck. The engine man, mail clerk and two passengers were injured.

24th, on Lehigh Valley, at Pittston Junction, Pa., a freight train descending a grade broke in two, and the rear portion afterward ran into the forward one, damaging several cars; conductor and one brakeman injured.

26th, on Norfolk & Western, near Petersburg, Va., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking 3 cars. The conductor was injured.

And 18 others on 14 roads, involving 4 passengers and 23 freight and other trains.

BUTTING.

4th, on Mobile & Ohio, at Meridian, Miss., an empty engine returning from the coal chute collided with another engine, going toward the chute, badly damaging both. One engine man and one fireman were injured, one of them fatally. One of the engines, having been reversed and deserted, ran back after the collision to Marion, about 5 miles.

14th, on Chicago & Eastern Illinois, near Danville, Ill., butting collision between freight trains, one of which was a switching train using the main line without leave. One engine man and one fireman were killed and one brakeman was fatally injured.

19th, 2 a. m., on St. Louis, Iron Mountain & Southern, near Monroe, La., butting collision between a freight train and a work train, badly damaging 7 cars. One engine man was killed and two other trainmen were injured. It is said that the work train was running on the time of the freight without leave.

And 6 others on 6 roads, involving 3 passenger and 9 freight and other trains.

CROSSING AND MISCELLANEOUS.

3d, 3 a. m., on Georgia Southern & Florida, near Cordele, Ga., an engine which had been detached from its freight train to take wood was run into by the cars, which had escaped control on the grade where they were left, and 3 cars were wrecked. One brakeman was killed and another brakeman and 2 tramps were injured.

7th, at North Birmingham, Ala., collision between a freight train of the Louisville & Nashville and a freight of the Southern Railway at the crossing of the two roads. Both engines were badly damaged. Both engine men and both firemen and a tramp were injured, one of the engine men fatally.

10th, 1 a. m., on Illinois Central, at East Cairo, Ky., a passenger train collided with a freight, badly damaging both engines, the mail car and a station building. One fireman was fatally injured.

11th, on the Union Pacific, at Denver, Col., three locomotives coupled together were run into, at the crossing of the Union Pacific, Denver & Gulf, at 19th street, by a coal train, overturning one of the engines. Three trespassers riding on one of the engines were pinned down in the wreck and were fatally scalded; a fourth was badly injured. It is said that the Gulf train was in charge of a fireman who mistook the signal at the crossing.

17th, at Laketon, Ind., collision between a freight train of the Wabash and a Wells Fargo Express train of the Erie at the crossing of the two roads, doing considerable damage and blocking both roads for several hours. Three trainmen were injured.

KINDL STEEL TRUCK MATERIAL FOR ONE TRUCK.

Name of part.	Letter.	No. Pieces.	Size of material.	Length.	Weight.
O. T. side frame.....	G	2	4 in. x 3 in. x 3/4 in. angle at 8.5 lbs.	10 11	185.4
L. T. side frame.....	K	2	3 1/2 " x 2 1/2 " x 3/4 " " " " 7.2 "	12 8	182.4
Yokes.....	H	4	3 1/2 " x 3 1/2 " x 3/4 " " " " 7.2 "	5 3	151.2
Journal.....	L	4	7 " x 3 1/2 " x 3/4 " " " " 15 "	1 11 1/4	86.6
L. side frame.....	S	2	3 1/2 " x 2 1/2 " x 3/4 " " " " 7.2 "	4 6 1/2	65.8
Filler.....	J	4	6 1/2 " x 3/4 " plates.	2 0 1/2	55.9
Splice.....	N	1	4 1/2 " x 3/4 " bars.	1 0 1/2	61.5
Tie bars.....	T	4	2 1/2 " x 3/4 " bars.	1 10	31.0
Journal.....	M	4	5 " x 3/4 " plates.	1 2	99.2
Filler.....	A	1	16 " x 3/4 " "	1 3	27.0
Separator.....	E	2	15 " channels at 33 lbs.	1 3 3/4	82.5
Gusset plate.....	B	2	15 1/2 " x 3/4 in. plates.	5 11	236.0
Cover plate.....	O	1	17 " x 3/4 " "	4 4	91.0
Center plate, pressed	F	1	15 " x 1 1/2 " "	1 5	44.0
Brake hanger.....	W	1	14 " x 1 1/2 " "	1 2	40.0
Side bearing.....	U	4	6 " x 3/4 " "	0 9 3/4	25.0
Transom.....	C	2	15 " x 3/4 " "	1 3	51.0
Separator.....	D	2	15 " channels at 33 lbs.	6 4 3/4	422.0
Bolts, with check nuts and split pins.....		8	3/8 " dia.	1 3	82.5
Rivet heads.....		252			8.0
Total net weight.....					2,083.0

inserted between the angles forming the lower arch bar. The parts are riveted together at both the top and bottom making an extremely strong and rigid connection, and as the transom channels rest directly on the lower truss members the load is carried from the transom into the side frames without straining the rivets.

The center plate used is of pressed steel, and the side bearings are formed from 3/4-in. steel plates. Double coil springs are interposed between the frames and journal boxes and transmit the load to the journals.

The various parts entering into the construction of the truck are designated by letters on the engraving, which refer to the following table, in which are given the names

semer & Lake Erie R. R. is all done by machine power, no hand riveting being required.

We are indebted to Mr. Kindl, for the drawings and dimensions of this truck.

Train Accidents in the United States in March.

COLLISIONS.

REAR.

2d, on Chicago & Eastern Illinois, near Brazil, Ind., a freight train ran into the rear of a passenger train, wrecking the rear passenger car. Six passengers were injured.

3d, on Southern Railway, at Lincoln, Ala., a freight

And 6 others on 6 roads involving 11 freight trains.

DERAILMENTS.

DEFECTS OF ROAD.

13th, 4 a. m., on Southern Railway, near Rome, Ga., a train consisting of 5 freight, 1 baggage and 3 passenger cars was derailed on a trestle over the crossing of the Western & Atlantic tracks, and the freight cars, baggage car and smoking car fell through. The engine crossed the trestle, but fell down a high bank and lodged in the Etowah River. The wrecked cars caught fire from the stove in the baggage car, and passengers in the smoking car were rescued with difficulty. The engineman fell with his engine and was fatally injured. The baggage man, express messenger and fireman were injured, the latter probably fatally. It is said that the trestle had been undermined by heavy rains.

23d, on Chicago & Texas, at Aldridge, Ill., the engine and 4 cars of a mixed train broke through a bridge which had been weakened by a flood and fell into the Big Muddy River. The engineman and fireman were drowned.

And 8 others on 8 roads, involving 1 passenger train and 7 freight and other trains.

DEFECTS OF EQUIPMENT.

5th, on Philadelphia, Wilmington & Baltimore, at Elkton, Md., a freight train was derailed by the break-

31st, 11 p. m., on Central of Georgia, near Tennesse, Ga., a freight train was derailed by a washout and the engine and 8 cars were ditched. A brakeman was killed and the engineman and fireman injured.

And 5 others on 5 roads, involving 1 passenger train and 4 freight and other trains.

UNEXPLAINED.

1st, on Great Northern, at Great Falls, Mont., a passenger train was derailed at a frog and the smoking car was overturned. Two passengers were injured.

4th, on Baltimore & Ohio, near Zanesville, O., a wrecking train was derailed and several cars fell down a high bank. Three employees were killed and two others fatally injured. The train was running at high speed, the engine was running backwards and the tender jumped the track at a curve.

15th, on Chicago, Hammond & Western, at La Grange, Ill., a freight train was derailed, the engine ditched and 2 cars wrecked. Two trainmen were killed and 3 others injured.

20th, on Baltimore & Ohio, near Oakland, Md., a passenger train was derailed, and the engine, baggage car and two passenger cars were ditched. One passenger was killed and 9 passengers and one trainman were injured.

24th, on Southern Railway, near Blacksburg, S. C., a

then proceed to the reduction plant on a lighter grade (in no place exceeding 7.5 per cent.) and under the control of the electric current and the brakes. The cable is then hauled back to the tunnel to be attached to the next train of loaded cars, the empty cars returning to the ore bins without the assistance of the cable.

The cars have a capacity of 10 tons each and are operated in pairs as shown by the accompanying engraving. Each is supplied with two 15-H. P. motors, the power being furnished by the electric plant in the city.

Track and wheel brakes are on each car, but the track brake is used only in case of an emergency. The electric hoist will probably be abandoned, as the combination of the two brakes can control the cars even on the 10.62 per cent. grade.

Mr. F. W. Blackford, City Engineer of Butte, has had charge of the construction of the line, which is owned by the Butte Consolidated Street Railway Co., the ore being hauled by them under contract with the Colorado Company. The information contained in this short description formed in part the address of Mr. John Herron, retiring President of the Montana Society of Engineers, and read by him at their recent annual meeting at Great Falls, Mont. We are indebted to Geo. E. Moulthorp, Engineer of the Colorado Smelting & Mining Company, for a photograph of two of the motor cars from which the accompanying engraving has been reproduced.

Malleable Iron Brakebeam—Atchison, Topeka & Santa Fe.

Through the courtesy of Mr. John Player, Superintendent of Machinery of the Atchison, Topeka & Santa Fe, we are enabled to illustrate the new malleable iron brakebeam made at the Topeka shops of that road. In the accompanying illustration this beam is completely shown. The compression member is + in section and the tension member T-shaped. The strut is cast integral with these members, and its section, *a b*, shows how it is designed so as to avoid undue strains when cooling. Instead of being solid or with straight webs between the brake lever fulcrum and the compression member, it is made with curved webs similar to the curved spokes of a fly-wheel. By this means it is thought that the strains due to cooling will be eliminated. This is a novelty in brakebeams, and it is hoped will prove successful.

M. C. B. Rules.

The following is the revision of the Master Car Builders' rules of interchange as recommended by the Southern and Southwestern Railway Club, at the regular meeting of April 8, Atlanta, Ga., omitting the explanations of the reasons for the changes:

Preface—To be altered to read as follows:

"It is the intention of these rules to make car owners responsible for, and therefore chargeable with, necessary repairs to their cars when away from home, due to ordinary wear and tear, in fair service, so that defect cards will not be required for any defects thus arising."

"Railway companies handling cars are responsible for damage done to any car by unfair usage, derailment, and for improper repairs made by them, and they should make proper repairs at their own expense and place a repair card on the car, covering the same, or issue a defect card covering all such damage or improper repairs. They also become responsible for missing material that they have failed to replace at the owner's expense, before offering a car in interchange."

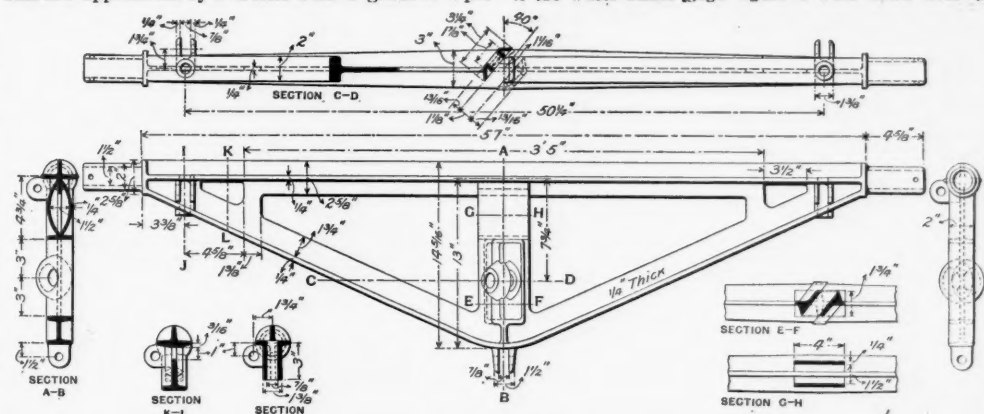
The Arbitration Committee, by its ruling C, assumes that there had been an inadvertent omission on the part of the Committee of Twenty One, in leaving out the old clause D of Rule 3, of the Rules of 1895, referring to wheels having flat vertical surfaces, etc. This was purposely omitted, after full discussion, because unless a plumb bob be furnished to each car inspector, it is impossible to tell whether the flat surface is absolutely vertical or not, and the absolute verticalness is of no consequence. It was deemed to be all that was necessary, by those who are practically familiar with the gaging and measuring of wheels, to condemn wheels for worn flanges if the wheel defect gage figure 1 went down over the

The Electric Railroad at the Gagnon Mine.

An electric railroad 2.7 miles in length has been built for the transportation of ores from the Gagnon mine to the reduction plant of the Colorado Smelting & Mining Co., at Butte, Mont. At the Gagnon terminal there is a tunnel 254 ft. long through the waste dump. This tunnel is on a 70-deg. curve and has a grade of three per cent. The timbering consists of posts 1 ft. sq., placed at 5-ft. centers, with caps and sills of the same size, the inside dimensions of the tunnel being 10 ft. wide by 10 ft. high.

The roof is on the plan of the ordinary house rafters and is lagged with 3-in. plank.

At the reduction plant terminal, the concentration bins are approached by a trestle with a grade of 2 per



"Damaged longitudinal sills accompanied by simultaneous damage to end sills or draft timbers."

Section 49 to be altered to read:

"Any company making repairs is solely responsible to the owners, with the exception of the cases provided for in Sections 38, 45, 46, 47 and 48, of Rule 3, and Sections 2 and 3 of Rule 4. The company making improper repairs should state the nature of the wrong repairs made by it on the repair card, which must be attached to the car when the repairs are made. A repair card covering the wrong repairs should pass the car home to the owners."

The Arbitration Committee, in a recent decision, No. 394, has made a ruling that the intermediate roads, handling cars having wrong repairs, should be held responsible for these wrong repairs by having to apply defect card, if no card is found on the car covering them. This was fully discussed when the rules were framed, and it was then believed to be more importance to insure prompt movement of the cars under all circumstances, to remove all possible causes for delays and disputes, unnecessarily rigid inspection, and cumbersome records at interchange points than to occasionally catch some cases of wrong repairs, which are too often of very small importance. A number of cases have actually been cited where the owners themselves have made wrong repairs on cars, and endeavored afterward to collect for the cost of changing cars back to the standard, on defect cards given by intermediate roads. There has also repeatedly been found cars carded for wrong repairs when the parts referred to were new standards, which were being introduced, or M. C. B. standards, which the road using them had a perfect right to apply. It is recommended that the responsibility for wrong repairs remain as originally arranged, as in Section 49, and that the ruling made by the Arbitration Committee, in case No. 394 be not embodied in the new rules. To do so is simply returning to the old plan of "Inspection for Protection," instead of the new plan "Inspection for Safety;" there have probably not been a dozen cases of disputes about wrong repairs since Sept. 1. Is it wise, on account of a few exceptions, to make a ruling that again draws the lines of inspection tighter at every interchange point, thus delaying thousands of cars passing daily all over the United States?

Following Section 7 insert what is now Section 14 in Rule 5 which is suggested should read as follows:

"When M. C. B. couplers, knuckles, hose or breakbeams are replaced, under conditions which make them chargeable to the owner, it must be plainly stated on the repair cards whether the material is new or second-hand."

Section 9 to be altered to read as follows:

"Any company finding cars not within the limits of standard height for drawbars may make repairs and charge to owners, provided the repairs are of a permanent character. Shimming on or under the springs, etc., cannot be charged to the car owners."

The rest of the section to read as now, but add after the word "unloaded"—

"The height to be measured from the top of the rail to the center of the drawbar shank."

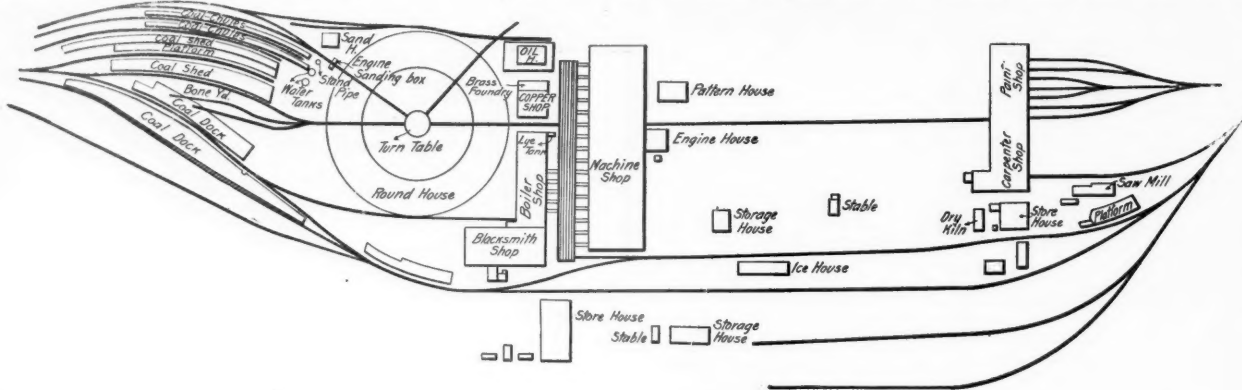


Fig. 1.—Plan of the Michigan Central Shops, Jackson, Mich.

Section 16 to commence as follows:

"In all cases when repairs are made to foreign cars a repair card, etc."

Also strike out the latter part of the first paragraph, after the words "making repairs."

Rule 5, Section 1—Add to this the following:

"The repair stubs to accompany the bills, 'or knuckles.'"

Section 6—To add after M. C. B. couplers, 'or knuckles.'"

The table of prices following Section 12 to remain unchanged except that the two paragraphs referring to the practice concerning the weight to be charged for brasses should be removed from the table, and should constitute Section 13. They are explanatory, and do not belong in this table of prices.

Following this, a new section should be added as—Section 14:

"No charge for labor should be made for applying brake-shoes, and no credit allowed for scrap."

Then should follow a new section—Section 15:

"Credit must be allowed for scrap equal to the weight of the new material applied, on all bills rendered under Section 1 of this Rule 5, except in the cases of brasses and brake-shoes, which have been specially provided for in Sections 13 and 14."

Present Section 13 to be numbered 16, and following sections changed accordingly.

Present Section 14 to be changed to read as follows:

"When M. C. B. couplers, etc., are used, if the prices for new materials are charged; if second-hand parts are used; only half the quoted prices can be charged."

Two-Rail Front Frame for a Passenger Locomotive.

The Baldwin Locomotive Works has recently delivered two eight-wheel passenger locomotives to the Georgia Railroad Co., having cylinders 18 in. diam., with a stroke of 24 in. Their weight in working order is about 108,800 lbs., of which 65,400 lbs. is on the driving wheels.

The special feature of the engines is the arrangement of the frame at the front end, which construction is shown by the engraving. The top rail of the main frame is carried forward to the back of the cylinder casting,



Fig. 3.-A.

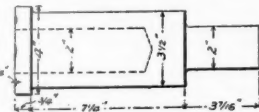


Fig. 3.-B.



Fig. 3.-C.

Details of Pneumatic Locomotive Jack.

and is there lengthened out by an upper bar passing over the top of that casting, and then dropping down to the back of the buffer. The lower frame is spliced at the front leg of the forward pedestal with a foot and angle brace in the usual manner. The rocker box is made to serve as a connection between the upper and lower rails with two through bolts that also hold the motion plate in place. Keys, as shown, are also driven to take the shearing stress off the bolts where two parts of the rail are fastened together.

This method of doubling the front end of the frame is not altogether new, as it has been used for some time in connection with the low-pressure cylinders of two-cylinder compound locomotives, but its use on simple engines having cylinders no larger than 18 in. in diameter is a novelty. That it is useful in distributing the strains

wide, one end of which is used for offices and drafting-rooms. The shop proper has a track extending the entire length through the center of the building, on one side of which are 15 erecting pits on which from 16 to 17 engines are rebuilt each month when the shops are working full time; on the other side are various machines and tools, driven by belts from overhead shafting. One of the largest tools in this shop is a 300-ton hydraulic press used for pressing driving wheels on axles, putting in crank pins and similar work; there are three large lathes for turning the tires of driving wheels, beside the planers, sharpeners and tools always to be found in locomotive

repair shops. Fifteen air hoists, varying in size, are placed convenient to the largest tools for handling work; these are so mounted on overhead travelers that one hoist can be used in connection with several machines.

Next to the tool side of the shop is the engine and boiler room. Two locomotive boilers are used, carrying a steam pressure of 55 lbs. per square inch, which supply steam for a 16 in. x 48 in. 80-H. P. Corliss engine, and also for an air compressor quite recently furnished by the Rand Drill Company. The compressor has two steam cylinders 10 in. x 16 in. and two air cylinders 7½ in. and 14 in. x 16 in. The air is compressed by means of two stages and is cooled while in the cylinders by means of a water jacket and also during its passage through the inter-cooler connecting the cylinders. The air pressure

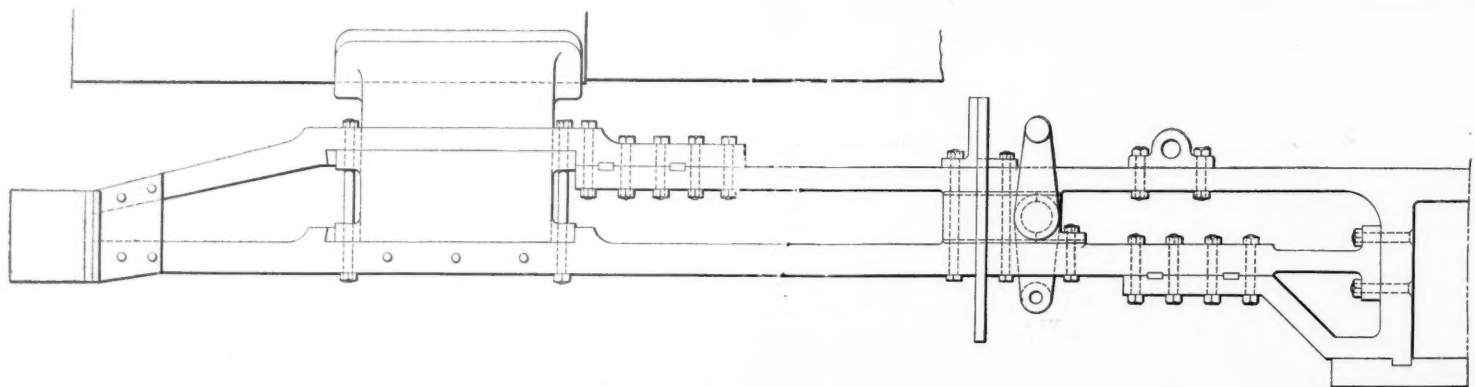
used is 120 lbs. per square inch. The operation of the compressor is automatic, being controlled by a throttling governor. When the pressure in the pipes and reservoir reaches 120 lbs. per square inch, the compressor starts and continues working until a pressure of 125 lbs. is reached, when the governor acts to stop the compressor. The air reservoir in the machine shop is a tank 4 ft. in diameter by 10 ft. 8 in. high; a 2½-in. air pipe is carried overhead the full length of the shop, while 1¼-in. pipes extend down to the floor between each erecting pit and are fitted with suitable angle cocks

and connections for hose attachment. The boiler shop is a building 50 ft. wide by 150 ft. long, and is equipped with a 20-ton, overhead power crane, built by the Bay City Industrial Works, which runs the full length of the shop. Among the larger tools are a planer, 17 ft. long, especially adapted to finishing the edges of boiler plate, furnished by the Niles Tool Works, and a four-spindle radial drill made by Bement, Miles & Co. This shop is also fitted with a reservoir and pipes for compressed air, as in the machine shop, so that pneumatic tools can be connected and used in any part.

The blacksmith shop is 65 ft. wide by 150 ft. long and has a separate stationary boiler and engine plant. There is one large furnace, for heating frames, axles and other heavy pieces, and one large and two small steam hammers. Flues are swaged and welded at one heat, a special tool being used, which is operated by compressed air. Oil furnaces are used for heating the flues. This shop in other respects is not different from the ordinary railroad blacksmith shop.

The Michigan Central Shops at Jackson.

The principal locomotive shops of the Michigan Central are situated at Jackson, Mich., and consist of yards and suitable buildings, covering altogether about five acres. While the shops were built several years ago, many important changes and alterations have been made recently, so that now the methods used and the facilities are very good. Occasionally new locomotives are built here, besides 326 engines which are kept in repair. A brief description of the plant, together with drawings of a number of special tools, are here given.



Two-Rail, Front Frame for a Passenger Locomotive.

This change is urgently needed on account of the multiplicity of patterns of couplers in service.

Section 25 to be altered to read as follows:

"Switching roads—that is, such as do the greater part of their business on the switching charges, or such as do not pay mileage to car owners for the use of freight cars, will not be allowed, etc."

Section 3, after the words "defect card," add "Covering all defects or improper repairs, etc."

The general arrangement of the tracks and buildings is shown in Fig. 1. There are a machine shop, boiler shop, blacksmith shop, carpenter and paint shop, copper shop, brass foundry and engine-house, besides numerous small buildings.

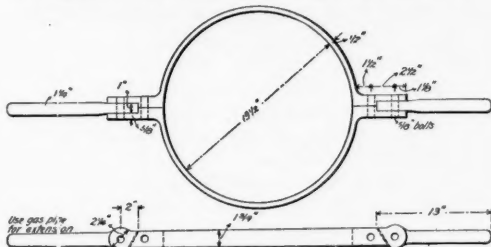
The machine shop building is 375 ft. long by 103 ft.

The copper shop and brass foundry are in the same building, which is 50 ft. wide by 60 ft. long. The railroad company makes all the brass and bronze castings used on the locomotives.

A separate building which is 30 ft. x 60 ft. is provided for the storing of patterns; this building is of fireproof

construction. The pattern room is divided into sections, which are numbered, as are also the shelves, and the patterns are given numbers corresponding to the shelf and section to which they belong; a record is kept of the patterns which shows where each one can be found.

The engine-house forms a complete circle with the turntable at the center, there being in all 52 stalls, each 62 ft. long. Four of these are not available for use, as three are taken up by tracks leading from the turntable to the yard, as shown in Fig. 1, while one stall is partitioned off into two rooms, one being used for repairing air pumps, injectors, etc., while the other is devoted to the use of the engineers and firemen off duty. Hot water is used for washing out boilers, several old locomotive boilers, placed between the pits, furnishing steam for heating the water. This building also is fitted throughout with facilities for using compressed air.



Handle for Locomotive Jack at Jackson Shops.

The transfer table, between the roundhouse and machine shop, is operated by means of a separate stationary engine and boiler carried on the table.

In all the buildings are water mains placed beneath the floors. In case of fire an alarm is given by means of electric apparatus at the pump-house, distant about one-quarter of a mile; the pumps are then operated so as to maintain a water pressure in the mains of 10 lbs. per square inch. Arc lamps are used throughout for lighting, the current for which is obtained from the city.

There are several methods and appliances in use at this point which are not common and possess advantages over the customary means employed. One of these is the small sanding box shown in Fig. 1, mounted on a trestle 16 ft. high above the track leading from the turntable to the coal wharf. The sand is delivered to this box from the house in which it is dried through a pipe by means of compressed air. As will be seen the location of this box is such that while an engine is taking water at the stand pipe it is in a position to be also supplied with sand through a flexible pipe fixed in the bottom of the sanding box; a valve in the pipe controls the flow of sand.

A shop practice not common is the use of steam to heat cylinder castings when putting in bushings. The cylinder heads are put loosely in place, but not bolted,

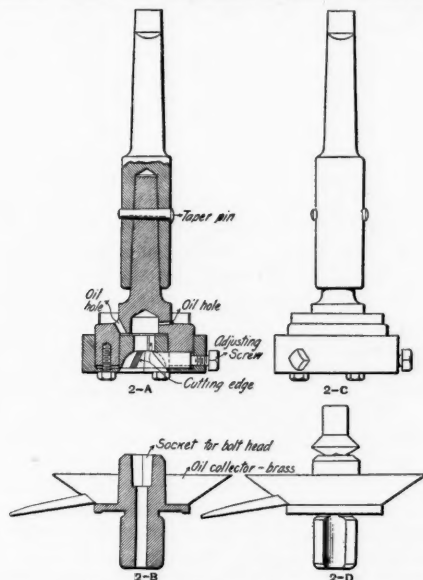


Fig. 2.—Device for Turning Patch Bolts—Jackson Shops

and steam at low pressure is admitted; at the end of 15 or 20 minutes the cylinder walls become heated sufficiently to allow the bushing to be slipped into place. The even heating effect obtained from steam is clearly superior to the more commonly used charcoal fire, gasoline burner or tools for forcing in the bushings without first heating the cylinders.

For cleaning brass and iron locomotive parts which have to be refitted a large lye tank is provided, into which steam is blown. For convenience in lowering or removing heavy parts a crane and air-hoist are used. The advantage arising from cleaning parts in this way is that flaws in the material or cracks are clearly shown, and also the expense is less than when the work is done by hand.

Fig. 2 shows a special tool for turning patch bolts. This consists of two parts 2-A being so formed as to fit the spindle of a drill press while 2-B, which holds the work, is attached to the table. The patch bolts in the rough are drop forgings so that it is only necessary to take a light finishing cut. The head of the bolt is inserted in the socket, 2-B, the spindle lowered and 2-A

finishes both the straight and bevel portion of the bolt. There are three cutting edges for the straight and three for the bevel surface, which can be adjusted by means of set screws to suit the size of the bolts being turned. The arrangement provided for admitting oil to the work and afterward collecting it is clearly shown by the drawings. The bolts are threaded in an ordinary bolt machine. About 1,000 patch bolts are used on the Michigan Central R. R. each month and by the use of the tool illustrated the cost has been reduced from about three cents each to considerably less than one cent.

Fig. 3 is a pneumatic jack for raising engines in the erecting shop in order to remove the wheels and frames, being used in place of ratchet jacks. The cylinder is of cast iron and has a diameter of 18 in. with a piston lift of 12 in., the pressure exerted being about 25,000 lbs. The piston rod is a wrought-iron pipe, 3½ in. outside diameter, with a hardened steel bushing inserted in the upper end, which holds the extension pieces Figs. 3a, 3b or 3c. One feature of this jack which makes it particularly adapted to the work for which it was designed is, that by placing the extension piece, Fig. 3c, in the jack with either of the other extension pieces between it and the engine, the locomotive can be shifted, when the weight is on the jack, to either side, forward or back, the amount of the eccentricity of the part shown in Fig. 3c. This makes the work of lowering the boiler and frames on to the drivers a simple operation, and avoids using jacks to slide the engine sideways in order to bring the boxes in line with the jaws of the frame.

The use of this tool has so simplified the work of stripping engines that in the Michigan Central shops laborers now perform this work which was formerly done by machinists. Three men constitute a gang whose duties are to jack up engines coming into the shop for repairs, remove the wheels and strip them ready for the regular pit gang.

Fig. 4 is a section and plan of the pneumatic jack used in connection with the drop pit in the engine house, which pit is about 8 ft. long and is not shown in the engraving. The jack is mounted on a small four-wheel truck running on rails, placed at right angles and below the track in the engine-house. The engine is brought over the drop pit and the jack placed under the axle of the driving wheels that are to be removed. The driving wheels are lifted sufficiently to permit of the removal of the temporary track over the pit, and are then lowered until they can be passed clear of the frames. The jack and driving wheels are then moved sideways along the track shown in Fig. 4 until opposite the adjoining house track. The wheels are then raised, rails are placed beneath and the driving wheels are rolled out of the way on the track nearest the engine. The construction of the jack proper is clearly shown in the illustration.

We take this opportunity to acknowledge our indebtedness to Mr. T. J. Hennessey, Master Mechanic; Mr. W. N. Case, Superintendent of the Shops, and Mr. D. R. MacBain, Traveling Engineer, for the information furnished and many courtesies shown to a representative of this paper during a recent visit at Jackson. In another issue will be shown drawings of engines now in use on the Michigan Central.

Foreign Railroad Notes.

The French Ministry of Public Works asks for authority to modify the present legal regulations regarding the fencing of railroads, so that the department may permit railroads or parts of railroads to be operated without fences and crossing gates when this may seem compatible with the public safety. The proposed change in the law would still require fencing in all cases where the lines or parts of lines have more than three trains passing in one hour; in all villages or other agglomerations of houses; on sections alongside a public highway, unless the track is on an embankment more than 6½ ft. high; for at least 10 rods on each side of every crossing at grade; and along approaches to stations or other stopping points. Before any authority is given to dispense with fences, the railroad management, the prefect and general council of the department in which the railroad lies, and the council of the Corps of Bridges and Highways must be asked to submit opinions on the matter. In any case the ministry is to have authority to subject the railroad at any time to the general rule requiring fences and barriers. This apparently backward step is probably due to the extension of local lines through some very barren districts, where there are few people or cattle, which until recently were very seldom crossed by railroads.

The Prussian State Railroads pay to laborers who have served satisfactorily 25, 35 and 50 years yearly premiums of from \$7 to \$24. In 1896 there were 2,106

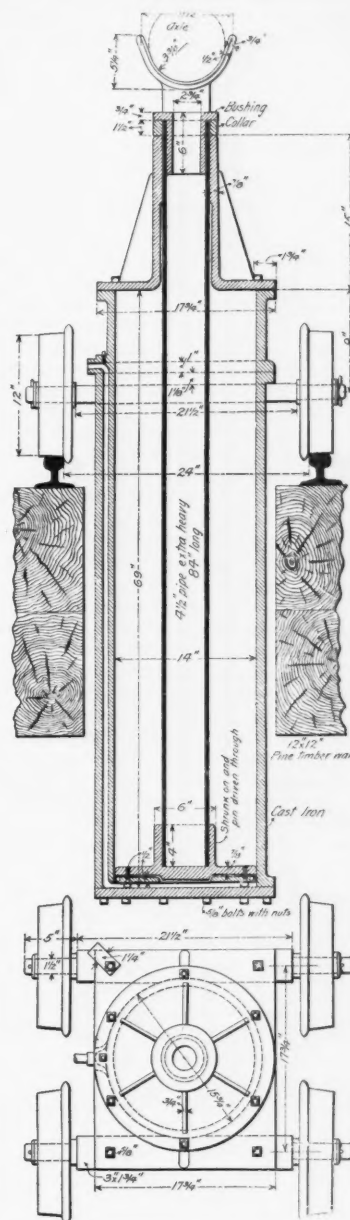


Fig. 4.—Pneumatic Jack for Drop Pit—Michigan Central Railroad.

who completed their 25th, 375 their 35th and 39 their 50th year of service. Fifteen of the oldest were decorated by the Emperor.

The London & Northwestern Railway of England has issued a statement calling attention to the fact that the Board of Trade reports of the number of railroad employees injured in Great Britain are likely to be misunderstood to the prejudice of companies which, like the L. & N. W., faithfully report every injury. As is appar-

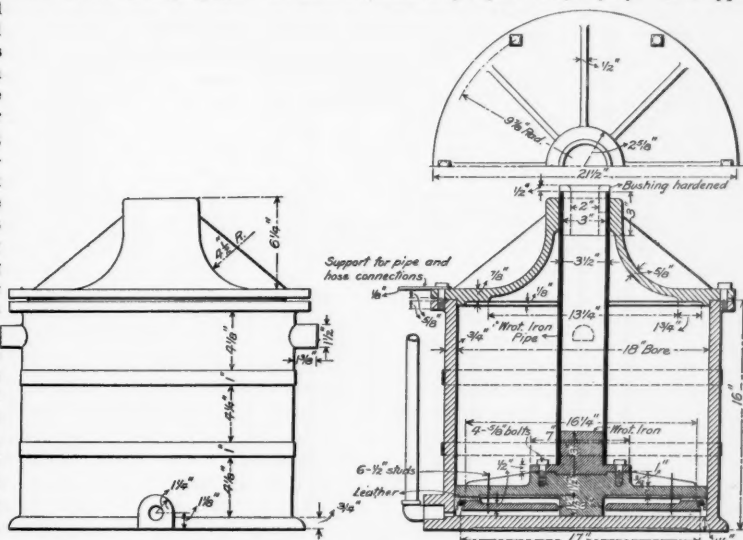


Fig. 3.—Pneumatic Locomotive Jack—Michigan Central.

ent to everybody, some roads (in America as well as in England) have a very loose standard as to what classes of accidents to include when making their reports to the state officials. In the matter of the number of employees killed, in which there is little room for difference of opinion as to how to make up the return, the London & Northwestern claims to show a far smaller proportion of killed to employed than appears on the other roads of the United Kingdom.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

We do not always find in the railroad shops a broad and comprehensive knowledge of "the previous state of the art," but we do sometimes come across men who, when they show some new arrangement or device, first explain what others have done along the same line and why the arrangement shown has proved better suited to their own needs. A case of the latter kind came to our notice a short time ago, and we learned that for some time it has been the custom for the Superintendent of Motive Power, his assistant, the Master Mechanic and the General Foreman of the shops to make every month a visit of inspection to the shops of some other road to inform themselves in the practice of others, and we were told that many new ideas are gained in this way. It is often found that while the identical arrangements cannot be used to advantage, yet by a few minor changes to suit local conditions equally good results can be obtained. Another, and perhaps equally important, advantage of information gained in this way is the opportunity to profit by and to avoid the mistakes made by others. On roads where this plan of interchange of ideas is carried out the officers are apt to be broad-minded men, and their subordinates, as well as the shops and tools, reflect their progressive ideas.

The decision of the Supreme Court of Connecticut upon the question of the servitude of street railroad tracks on the highways has been followed by a ruling in a lower tribunal of that state, which may have very important results. Some time ago a trolley road was projected between the village of Stratford and the borough of Shelton, a distance of about nine miles, and a charter was obtained. As the road, if built, would, by means of other similar lines, have joined Bridgeport with the two cities of Ansonia and Derby, as well as with Shelton, and would have been a close parallel of the Naugatuck Division of the New York, New Haven & Hartford steam railroad system, it was sharply opposed by the steam corporation. The Connecticut general street railway law, passed in 1893, provides that when a street railroad company wants to build a cross town line, a new road paralleling either a steam road or another street railroad, it must obtain a finding from a Superior Court judge that public necessity and convenience require the new road. Hitherto in their rulings on such a question, the Superior Court judges of the state have not gone outside of an inquiry into the needs of the community to be served by the proposed new trolley, but in the Shelton and Stratford case last week Judge G. W. Wheeler, after a host of witnesses had testified in favor of the project and after he had himself passed over the proposed line, made a decision which greatly amplified the question of public necessity and convenience. He found that a trolley line between the two places accorded with such public necessity and convenience; but he also found that the directors of the company had done nothing toward the

construction of the line, that there was no well-defined "corporate purpose," that there had been failure to "prove intention," that the company was inadequately capitalized and that public necessity and convenience required not merely "a road," but one honestly projected and constructed. His words on the subject are as follows:

"If it should appear that the applicant is bankrupt and that the road will exist on paper, that its promoters were but speculators intending to hawk the franchise about the state, no public interest could be conserved by such a road, and I don't think that the public convenience and necessity would require such a road. Under the statutes the intentions to build such a road must be proven."

He accordingly ruled against the project, and if his finding is either sustained on appeal (which has already been taken) or adopted by the other seven Superior Court judges in the state, there is an end of speculative trolley building and chartering in Connecticut. The general (steam) railroad law of the state, passed in 1875, requires that no construction can begin until \$10,000 per mile has been subscribed for stock, and \$1,000 of it paid in, while the funded and floating debt of the corporation shall at no time exceed the amount of cash actually paid in upon its capital stock. Toward some such restrictions hereafter on building new electric roads in the state, Judge Wheeler's opinion points directly, and they would be far more effective checks on the evils which he rebukes than the uncertain decrees of individual judges.

Last week just after we had gone to press the announcement was made of the New York Central's scheme for refunding its bonded debt. It appears that arrangements have been made with J. P. Morgan & Co., of New York, and J. S. Morgan & Co., of London, by which the funded debt of the New York Central and the New York & Harlem will be converted into one 3½ per cent. first mortgage bond. The amount to be issued is \$100,000,000 with which it is proposed to retire the following issues:

	Rate.	Amount.	Mat.
First mortgage.....	7	\$30,000,000	1903
First mortgage.....	6	9,733,333	1903
Debtenture (coupon and registered)....	5	11,000,000	1904
Debtenture (coupon and registered)....	4	13,191,000	1905
Debt certificates (coupon and registered)....	4	6,100,000	1905
New York & Harlem.....	7	12,000,000	1900

The aggregate is \$82,677,000. The saving in interest by the refunding will probably be something like a million and a half dollars and it is conjectured that the New York Central will be able to pay five per cent. dividends after this transaction is completed. That, however, is contingent upon several other things than interest or fixed charges and it is hardly worth while to go into a speculation as to the probabilities of five per cent. Eighty-five million dollars of the bonds will be used to take up the bonds now outstanding and \$15,000,000 will be reserved to be used for new construction after 1903. After the apparent success of the Lake Shore enterprise toward refunding at 3½ per cent. this action on the part of the New York Central was expected and it is to be hoped that the markets and the condition of the country will soon be such as to warrant various other roads in like undertakings.

Russian Grain Transportation.

In connection with movements for modifying the grain freight so as to facilitate exports, elaborate statistical investigations of the production and movement of grain have been published in Russia, showing the shipments from different sections of the producing country to exporting points and to interior centers of consumption—probably the most complete statistics of the kind ever published for any considerable country, and especially interesting in this country, the principal rival of Russia for the supply of the European markets. Among the tables is one showing the distance traversed in the interior of all the grain exported before arriving at the ports on border stations. From this it appears that in spite of the great extent of Russia and the great reduction in rates made by the tariff of 1893 for shipments over great distances, 1,300 to 2,300 miles, no grain whatever was shipped for export in 1894 over a distance of more than 2,500 versts (1,665 miles) from the border, and less than 1 per cent. of the exports were carried more than 1,330 miles, while nearly 55 per cent. of them moved less than 265 miles—which is as if more than half of our export grain was produced east of Pittsburgh or south of Memphis.

For the year 1893, the first of the reduced rates, the quantities are given, showing that out of 170 millions of bushels of exports, less than 13 millions was carried as far as 1,000 miles by rail or river, and less than 50 millions as far as 665 miles. This shows the great advantage Russian farmers have over ours; the great grain-producing territory—or one end of it, at least—is close to the western and southern border of Rus-

sia, and requires no more inland transportation than the wheat lands on our Pacific coast, while the southern side of this territory is near the Black Sea. In 1893, out of 90 million bushels exported from the southern ports of Russia—those on the Black Sea and the Sea of Azof—74 millions were carried less than 333 miles, and 10 millions less than 66 miles, while less than 60,000 bushels came as much as 665 miles. The exports from the Baltic ports are carried further, the production in their latitude being almost exclusively oats and rye, and to these ports about 33 million bushels came from points 333 to 665 miles distant—this still being very trifling compared with the distances the exports of the Mississippi valley have to go—a very large part moving 1,500 miles or more before reaching the sea.

The Russian grain growers, however, have felt the low prices of the last few years perhaps more than those of any other country. The great mass of the large landowners are said to be in a condition bordering on bankruptcy, and determined efforts have been made to have the government do something for their relief. We have before noticed the petition of a great Russian farmers' congress that the government should still further reduce the railroad rates to a uniform charge on cattle, as well as grain, of 0.01 kopek per pood per verst, which is equal to about 0.42 cent per ton per mile, or about at the rate of 20 cents per 100 lbs. from Chicago to New York. The government authorities had no difficulty in showing that the proposed rate would reduce railroad earnings about \$5,000,000, and that seven-eighths of this loss would fall directly on the government—that is, the tax-payers, who are chiefly the very landowners who are seeking relief. They also showed that the proposed rate would reduce the charges on the shipments from remote parts of the empire, where land has never been worth much, so much more than on those from the farms nearer the large towns and the export markets, whose owners are the chief sufferers, that it would inevitably increase the very competition of which the petitioners complain.

Only a comparatively small part of Russia is properly a grain-growing country. The recent statistics show that of all the grain transported in the country during the three years ending with 1895, more than three-fourths was shipped from stations in what is called the "black land" country, which is south of a line beginning in the west, near Warsaw, and extending about northeast by east a little south of Moscow nearly to the Ural Mountains, but not extending so far south as the Caspian, and including little territory south of the Don. This is about one-fourth of the area of Russia in Europe, and not greater than that of the two tiers of grain-growing states north of Arkansas and Indian Territory and west of the Mississippi, namely, Minnesota, the Dakotas, Iowa, Nebraska, Missouri and Kansas.

Among the interesting Russian grain statistics are tables showing the average distance hauled and freight paid on shipments to each of the principal markets, both exporting and interior. From this it appears that average distance grain was carried in Russia was 446 miles and the average freight paid 18½ cents per 100 lbs. A notable fact is that the grain exported is carried (in Russia) on the average a less distance than that consumed in Russia, the average haul of grain carried to exporting markets being but 328 miles in 1895, against 446 miles for all grain shipments; and in 1895 the exports came greater distances than ever before. The figures are given for five years and the average haul of export grain was but 250 miles in 1890, rising to 280 in 1893, 292 in 1894, and 328 in 1895, indicating that the new grain tariff has enlarged the territory which is able to export—a fact of importance to Russia's rivals. The average inland freight on grain exported was 12.4 cents per 100 lbs. in 1895, from the station where shipped to the seaport or border station.

It appears that the grain going to Odessa, the Black Sea Chicago, comes from interior stations on the average only 186 miles distant, and pays on the average 11.3 cents per 100 lbs. to get there. The grain shipped from the Azof ports Taganroz and Rostov is still nearer those ports. On the other hand, that which goes to St. Petersburg is carried on the average 700 miles at a cost of 24½ cents per 100 lbs.; to Revel 930 miles, for 30½ cents; to Riga, nearly the same as to St. Petersburg; and to Dantzic (a German port to which, by arrangement, the Russian grain rates apply) 833 miles, at 27½ cents per 100.

While the unprofitableness of grain-growing in Russia of late years should have a tendency to check production, actually it has increased. Substantially, the people are unable to do anything else with their land, apparently, and so must continue to grow grain so long as the receipts exceed the actual yearly expenditures. The amounts transported in the Empire

for seven years have been, in millions of bushels of 60 lbs. each:

1889.	1890.	1891.	1892.	1893.	1894.	1895.
293.4	288.6	307.2	269.4	340.8	439.2	426.6

Doubtless not half of the whole production is ever shipped, but is consumed near the place of production; for the population is more than 90 millions, and must require for food more than the greatest quantity ever carried; while the consumption for the feeding of animals must also require hundreds of millions of bushels, and immense territories are too far from railroads or rivers to be able to supply any distant consumption; but in all probability the production could be enormously increased were there a sufficient demand. The fact that there are only 20,000 miles of railroad in European Russia indicates this. The growth of manufacturing industries, which might increase the home market for grain, is probably continuous but not rapid. Apparently about half of the grain transported is consumed in Russia. It is true that the shipments to seaports and border stations are usually something like three-fifths of the whole, but these ports are themselves large consumers. These shipments, which include all the exports, have been, in millions of bushels:

1889.	1890.	1891.	1892.	1893.	1894.	1895.
177.0	178.8	166.2	105.6	185.4	267.0	243.0

The famine was in 1892; but even then the exports were more than twice as great as those of India, of which we have heard so much, have ever been. Excluding the famine year, the average yearly exports to the end of 1893 were 178 millions of bushels; for the two following years, 255 millions; and the increase of 77 millions is equal to the whole usual supply coming to Europe from all our other competitors combined. Our own export of wheat (including flour) was 225½ million bushels in the year ending June 30, 1892, and 145 millions in 1895. The yearly average for six years from 1889-90 to 1894-95 inclusive was 157 million bushels.

The present indications are that additional facilities will be given for Russian exportation. The opening of the Siberian Railroad is not likely to have much effect, except possibly in supplying the limited Chinese and Japanese demand, which for a year past has been considerable and has been supplied almost entirely from our Pacific coast. If the Siberian Railroad were likely to add to the supplies of Western Europe it would be very unpopular in Russia. But the present is a period of great activity in railroad construction in European Russia, and this cannot fail to increase the territory which can export, whether the railroads are profitable or not. The Russian black lands probably have not one-fifth the railroad mileage, in proportion to territory, of the chief grain-growing states of the Mississippi Valley, and there are large districts 40 or 50 miles from a railroad. The inland transportation rates, as we have seen, have been low for the last three years; and the negotiations now in progress, for which the above quoted statistics have been collected, are sure not to result in higher rates, and possibly in some further facilitations of exports. Freight from the Black Sea are usually somewhat higher than from our Atlantic ports; but from the Baltic they should be materially less. Nearly all Russian ports are closed in winter, however.

March Accidents.

Our record of train accidents in March, given in this number, includes 49 collisions, 71 derailments and 3 other accidents, a total of 123 accidents, in which 40 persons were killed and 86 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

COLLISIONS.	Rear.	Butting and other.	Crossing and other.	Total.
Trains breaking in two.....	14	0	0	14
Misplaced switch.....	2	1	0	3
Failure to give or observe signal.....	3	0	2	5
Mistake in giving or understanding orders.....	0	2	0	2
Miscellaneous.....	6	4	3	13
Unexplained.....	4	2	6	12
Total.....	29	9	11	49

DERAILMENTS.	Total.
Broken rail.....	1
Loose or spread rail.....	3
Defective bridge.....	6
Broken wheel.....	1
Loose wheel.....	1
Broken axle.....	9
Bent axle.....	1
Broken truck.....	2
Fallen brakebeam.....	2
Failure of drawbar.....	1
Misplaced switch.....	2
Careless running.....	1
Derailing switch.....	2
Animals on track.....	3
Landslide.....	3
Washout.....	1
Malicious obstruction.....	4
Ice on track.....	1
Unexplained.....	23
Total.....	71

OTHER ACCIDENTS.	Total.
Boiler explosion.....	1
Broken side rod.....	1
Other causes.....	1
Total.....	3

Total number of accidents..... 123

A general classification shows:

	Collisions.	Derailments.	Other accidents.	Total.	P. c.
Defects of road.....	0	10	2	12	8
Defects of equipment.....	14	18	0	32	28
Negligence in operating.....	23	5	0	28	24
Unforeseen obstructions.....	0	15	1	16	12
Unexplained.....	12	23	0	35	28
Total.....	49	71	3	123	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other accidents.	Total.
Passenger.....	12	26	3	41
Freight and other.....	37	45	0	82
Total.....	49	71	3	123

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accidents.	Total.
Killed:				
Employees.....	8	22	2	32
Passengers.....	0	4	0	4
Others.....	3	1	0	4
Total.....	11	27	2	40
Injured:				
Employees.....	24	23	0	47
Passengers.....	9	20	0	29
Others.....	9	1	0	10
Total.....	42	44	0	86

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	0	0	4	1
Defects of equipment.....	0	2	2	5
Negligence in operating.....	0	9	8	24
Unforeseen obstructions and maliciousness.....	3	4	11	9
Unexplained.....	1	14	7	8
Total.....	4	29	32	47

Twenty-two accidents caused the death of one or more persons each, and 18 caused injury but not death, leaving 83 (67 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with March of the previous five years shows:

	1897.	1896.	1895.	1894.	1893.	1892.
Collisions.....	49	57	36	40	72	75
Derailments.....	71	72	81	68	102	107
Other accidents.....	3	5	9	4	12	12
Total accidents.....	123	134	126	112	186	194
Employees killed.....	32	18	21	17	36	37
Others killed.....	8	10	2	5	4	3
Employees injured.....	47	49	61	63	71	93
Others injured.....	39	46	19	23	114	100
Passenger trains involved.....	41	37	36	38	73	68

Average per day:

	1897.	1896.	1895.	1894.	1893.	1892.
Accidents.....	3.97	4.32	4.06	3.61	6.00	6.23
Killed.....	1.29	0.90	0.74	0.71	1.29	1.29
Injured.....	2.77	3.06	2.58	2.77	5.97	6.22

Average per accident:

	1897.	1896.	1895.	1894.	1893.	1892.
Killed.....	0.33	0.21	0.18	0.19	0.21	0.20
Injured.....	0.70	0.71	0.63	0.76	0.99	0.99

Of the four passengers killed in March three were victims of a derailment at Hazelton, Ind., on the 10th, which was one of a number of mishaps due to the extensive floods that prevailed at that time throughout many states. In the report of this accident we have the very unusual statement that the bodies of all the five persons fatally injured were lost; they were washed away in the flood and were never recovered. The other fatal accident to a passenger was that at Oakland, Md., on the 20th. There were two other bad accidents to passenger trains (Rome, Ga., and Wolf Creek, Kan.), and in the derailment of a work train near Zanesville, O., on the 4th, five employees were killed. The accounts would seem to indicate that this derailment was due to careless running. On the Manhattan Elevated road, on the 23d, there was a derailment due to excessive speed on a sharp curve. The derailment did no great damage, but it is a reminder that the protection of the lives of thousands of passengers on the elevated roads every day depends in a peculiar degree upon the carefulness of the engine-men. The Manhattan has a number of curves of 100 ft. or less radius and, of course, the speed has to be rigidly limited. On the whole, the discipline of the engine-men is very good, as is evident from the unbroken immunity from accident on these curves for many millions of trips; but the difference between a cautious rate of speed and one which comes up somewhere near to the limit of safety is so manifest to every passenger that whenever an engine-men experiments with the, latter limit the people in the cars are very quick to notice it, and to think of the possibility of accidents like that at Twenty-third street above referred to.

At Cole City, Ga., on the 13th, the engine-man and fireman of a locomotive on a coal-mine track were burned to death in a wreck due to a washout.

We have reports of seven accidents to street cars in March, all but one of them being on electric lines. In these accidents one person was killed and 25 were injured. There was one rear collision, two butting and one crossing; two derailments, and one case in which a street car was run into by a locomotive.

The action of the Board of Managers of the Joint Traffic Association in the matter of maximum dimensions of freight cars, briefly reported last week, practically means the approval of the majority report. Formal action by the Association has not yet been taken, the proposition to refer to the American Railway Association being now before the Board of Control for final disposition. The result cannot be in doubt, the Trunk Line and Central Traffic Associations having by a practically unanimous vote approved the majority report which was made last November. The roads in the Western Freight Association have already voted unanimously in favor of the majority report. This report, as given in the *Railroad Gazette* of Dec. 11 last, recommended that no box cars be built over 37 ft. long, 9 ft. 1 in. wide and 9 ft. high.

The minority report differed from that of the majority only in recommending that furniture cars be allowed to be made 40 ft. long. The majority held that cars of this length would, if built, be used in ordinary traffic. If all common box cars were made 37 ft. long, and cars for carriages, furniture, etc., were only 3 ft. longer, this view of the committee would undoubtedly prove to have been well founded. The present action, substantially rejecting the minority report, may therefore be taken as indicating a well-settled belief, among the chief officers of the largest railroads, that a single uniform size for the box cars of all roads, and for substantially all kinds of freight carried in box cars, greatly facilitating, as it would, the interchange and the recording of cars, and the work of caring for them, is a more important desideratum than to have extra large cars for bulky freight. There can be little question that this conclusion is sound, and the practical question, at present, therefore, is whether the adoption of the standard size and the abandonment of all odd-size designs will now be as heartily carried out in practice as it has been declared in theory.

It is high time that this reform were vigorously taken hold of. We are bad enough off, with the cars already built. A recent writer in the *Equipment Register* gave a list of over 4,000 cars now in service, belonging to roads in the Western Freight Association, which have a cubic capacity of over 2,700 ft. each. Over 500 of them are rated at over 3,700 ft. each. The car accountants are the men who realize the "large-car evil" as well as any class, and they are faithfully keeping up the agitation. At their last convention Mr. S. H. Church, of the Pennsylvania lines west of Pittsburgh, said:

I have been told that while some three or four hundred changes have been made in the Western classification, it was not a particular advance on the Eastern classification. It may be in a great many respects, but I don't think that it has solved the question yet. In other words, I don't think that even in the West you can load a barn in a corn-crib, and that is the principle on which all the classifications are working. This is really the most important car problem before the railroads to-day except that of honest mileage, and it causes more trouble in the daily distribution of cars than any subject that comes to the car accountant's desk. Every day we are asked for a furniture car for this one or that one, and one man gets it, while, on account of the very limited supply of equipment, the other man gets the ordinary car. That is discrimination. It is not voluntary discrimination or a voluntary cut in rates, but that is what it amounts to. You can see that it would drive out of business the man that continually gets the 28 or 34-ft. car when the 40-ft. car is given to the other man. And every additional year that the railroads build furniture cars only aggravates the question. We used to have 28-ft. cars. Then we came to the 34-ft. size, and the result was that 28-ft. cars were used for coal, or they were put on sidetracks. Then our daily reports would show a shortage of box cars when we had thousands of them on sidetracks. In the Eastern Association the steps that have been taken to change the classification simply result in a labored explanation of "how not to do it." You talk with any member of the Classification Committee and he will tell you of 100 different reasons why they cannot do it; and yet you have no right to charge a man for more freight than he can load in the car that you give him. You tell a man to pay you for 20,000 lbs. of freight and he is perfectly willing to do it, and you hand him a car that will hold only 12,000 lbs. That might be all right if you served all alike, but when you give him a 12,000-lb. car and give to some of his competitors a car that holds 20,000, you are discriminating. We have spoken out plainly before, but our resolutions have elicited no response, and it seems to me that the time has come for us to plead that our traffic representatives should give this matter attention. They don't know all the facts; they are busy elsewhere. They don't know that it is a matter of daily and hourly trouble to us, and that it works inequities in the whole business situation.

The *Financial Chronicle* in its last issue gives a summary of the net earnings of 131 railroads for the month of February. The result is a gain over the preceding year of 9.55 per cent. This was with an almost imperceptible gain in the gross earnings. Nearly the whole gain in net was in reduced operating expenses; that is, the railroads gained in gross \$5,144, and net, \$1,387,080. But what makes this showing still more satisfactory is that in 1896 the gain in net was more than \$2,000,000 above 1895. The largest increase in net earnings shown is that of the Chicago, Burlington & Quincy, namely, \$308,500. The Lehigh Valley shows an increase of almost a quarter of a million and the Pennsylvania an increase of \$191,000.

The man who enjoys the somewhat doubtful honor of having started the agitation which resulted in the Supreme Court's decision that it is wrong for two peanut vendors to consolidate their business for the purpose of making a better living, is Mr. J. E. Howard, of Wichita, Kan. This we learn from a Western paper, in which Mr. Ady, the former United States District Attorney, who began the suit against the Trans-Missouri Freight Association, interviews himself. Mr. Ady says that he brought the suit on his own motion, the participation of the Attorney-General in it being merely formal. Indeed, no assistance whatever was received from Washington or any other government source. "On the contrary," says Mr. Ady, "I was severely let alone in certain quarters from which assistance might have been expected." The part taken by Mr. Howard was the collection of facts and counselling the District Attorney so that he should be sure to have "a clear insight into the nature of the combine." The only helper in the case beside Mr. Howard was Mr. Peters, Mr. Ady's law partner, who assisted in arguing it before the court.

NEW PUBLICATIONS.

Practical Tunnelling. By Frederick Walter Simms, F. G. S., M. Inst. C. E. Fourth edition, revised and greatly extended, with additional chapters illustrating Recent Practice. By D. Kinnear Clark, M. Inst. C. E., etc. Royal octavo, 518 pages, with 36 plates and other illustrations. Index. New York: D. Van Nostrand Co. 1896. Price, \$12.

Simms on Tunneling is a classic, but like some other classics, a little antiquated; everything from the pen of Kinnear Clark has value. The original work of Simms conforms to its title "Practical Tunnelling." Published about 50 years ago, it describes with great prolixity, but with great completeness, all the details of the construction of two of the early tunnels on the South Eastern Railway of England. The tunnels were in earth, sand and clay. A small heading was driven completely through before the enlargement was commenced, with the double purpose of draining the ground and of verifying the alignment. The water was lifted from the shafts in buckets and barrels raised by a horse gin. In other respects the operations of excavating, timbering, centering and brickwork, which are fully illustrated in their various phases, were executed very much as they would be at the present day. Costs, both in time and in money, of the various operations are given in great detail.

The treatise of Simms occupies nearly 200 pages, about one-third of the book. The work of Mr. Clark is somewhat desultory, having been written as supplements to different editions of this work. That they are not more condensed is probably due to the untimely death of their author.

Mr. Clark first discusses in a general way the driving of tunnels and the relative merits of top and bottom headings, which in fact depend upon the conditions of each case. He concludes, however, that in long tunnels the top heading is a necessity, as shown by its use in the St. Gothard tunnel, overlooking that the Arlberg, the most successful of Alpine tunnels, was worked with a bottom heading by means of which the details of operations were arranged in the most systematic manner.

The Mont Cenis tunnel is described and illustrated in 30 pages; 65 are given to the St. Gothard. The descriptions are brief but comprehensive, giving with some completeness the features of those works which were at that time novel, and at all times of interest. The great difficulties experienced in the latter tunnel when passing under the plain of Andermatt are briefly referred to. As a detail not mentioned by other writers we condense from Mr. Colladon, Consulting Engineer to the Favre (contracting) Company: "At 2,800 metres from the northern end a friable material was encountered formed of decomposed feldspar, mixed with gypsum and alumina which, absorbing atmospheric air, and yielding to a pressure from above of a stratum 300 metres thick, squeezed and swelled with a force so great that the strongest timbering was insufficient and the archings calculated by the Chief Engineer were twice crushed. The actual arch is of granite 1.5 m. (5 ft.) thick at the crown, with abutments 3 m. (10 ft.) thick."

The Arlberg tunnel is not mentioned except to give its cost. Brief descriptions are given of some half dozen English tunnels built more than 40 years ago and of a few modern examples. Much space is given to methods of alignment, a most necessary element in the construction of tunnels; one, however, in which good results are generally obtained with much less cumbersome methods than those which Clark describes. The London Underground is briefly mentioned, the Glasgow water-works tunnels are described in detail, and some interesting features of the Severn tunnel are given. We call attention to the remarkable fact connected with the latter, that the pressure of water coming through seams in the rock having, during construction, crushed the brick lining of the tunnel, a sump and pumping machinery were introduced to carry off the water, which are still kept in operation ten years after the completion of the works.

There is a chapter on ventilation, with estimates of the required velocity of ventilation and the power required per mile of tunnel under various conditions. "Casualties" is rather historical than "practical," although methods of overcoming difficulties are in some cases described.

Soft ground (sub-aqueous) tunnels worked with the aid of compressed air are described at some length. This class of work has developed very rapidly in the last 10 years, beginning with the City & South London tunnel; chiefly, however, imitating that work in the small size of the tunnels, 10 to 12 ft. in diameter. The author, however, gives a good deal of space to larger works of this class, the St. Clair, the Hudson and the Blackwall tunnels, with full descriptions and drawings of the last named.

The book ends with a chapter on machine drills which have previously received much attention in the descriptions of the various works.

On a cursory examination the book appears to be a series of short notices of many tunnels, rather historical than "practical," but a more careful reading discloses a considerable amount of information both as to construction and cost.

Difficulties encountered are described, but the methods by which they are overcome are not always given. Tunnels are mentioned which have no special interest, unless to show that they were not forgotten. Mr. Clark is here the literary engineer, and the old Simms, for the ground covered, is much more "practical" than the modern writer.

Rapalje & Mack's Digest of Railway Law. Vol. VI. Northport, L. I., N. Y.: Edward Thompson Co., 1897.

We have before us now the Sixth Volume of Rapalje & Mack's Digest of Railway Law, embracing titles from Interstate Commerce to Receivers, both inclusive. The volume comprises over 1,200 pages, and maintains the high standard of excellence of the preceding parts of the work.

Some of the interesting titles digested are: Interstate Commerce, Judgment, Land Grants, Leases, Libel and Slander, Liens, Limitation of Liability, Malicious Prosecution, Mandamus, Mortgages, Municipal and Local Aid, Negligence, Physical Examination, Pleading, Private Railroads, Private Ways, Railroad Commissioners and Receivers.

The subject of "Interstate Commerce" is examined with great thoroughness, embracing over 70 pages and 228 sub-titles, each of which contains the digest of one or more decisions. The treatment of this topic is especially interesting as it includes the decisions of the Interstate Commerce Commissioners which are embodied in six volumes of the size of the ordinary law report. We do not know any digest so comprehensive and thorough as the volume before us, on this topic.

"Land Grant Railroads" and "Land Grants" will be found especially interesting. The digest in the latter case, views the decisions, first according to their general principles, and then from the standpoint of federal grants to states, as well as to railroads, then the state grants to railroads and finally, grants of swamp lands and the Canadian grants. This topic is almost, if not quite, a stranger to digests; notwithstanding the importance of the subject to the railroads in the Western States, and other more recently developed countries.

Perhaps there is no subject upon which the management of railroads has more occasion to consult counsel than that of "Leases." This subject in the volume before us is digested under 142 sub-titles, embracing a large number of decisions and cross-references to the various ramifications of the subject under other titles and in other volumes.

The layman will probably be surprised to learn that a corporation which can neither speak nor write and has no soul, is nevertheless subject to the law of "Libel and Slander" and of "Malicious Prosecution." These titles exhibit interesting distinctions, showing when a corporation is liable for libel or slander and when it has the privilege of holding others liable to it for libel and slander, and also when it prosecutes or is prosecuted maliciously. Nothing is so interesting in the development of modern law as to trace the progress of the courts toward holding such an artificial being as a corporation to all the responsibilities of natural persons. The volume before us brings to the front some of the most interesting and latest decisions on this subject.

The title "Mortgages" receives comprehensive and satisfactory attention, and is treated under the heads: Power to Mortgage, Property that May Be Mortgaged, Execution, Registration, Filing, Validity and Interpretation, Trustees, Enforcement, Extinguishments and Redemption. If we may judge from the space the subject takes in the Digest, municipal and local aid to railroads has occasioned as much litigation as any other subject treated in the volume. It covers about 530 pages, 455 sub-titles. The treatment of the topics "Pleading and Receivers" seems to be thorough and satisfactory.

We are glad to commend this volume as a worthy successor in all respects to those which have preceded it.

The Application of Electricity to Railway Working. By W. E. Langdon, Superintendent and Engineer of the Electrical Department of the Midland Railway of England. 147 illustrations. New York: Spon & Chamberlain, 12 Cortlandt street; \$5.

This book of 330 pages is the same in name as an earlier work by the same author, but the present treatise is practically all new, the progress of electrical science having demanded changes and additions throughout the work. The author speaks from long practical experience in the field of which he writes, and this fact is patent on every page. He divides his subject into the telegraph, block-signaling, electric light and power, train lighting and administration. He confines himself strictly to the railroad field, but within that field his treatment of each topic is full and instructive, yet not tediously long. Mr. Langdon uses clear and simple language, making the reading of the book pleasant, and information not derived from his own experience appears to have been gathered at first hand. The principal value of this work to an American reader is in its numerous descriptions of the method of dealing with innumerable details in English practice. The ways of Englishmen are not always to be imitated in America as soon as they are discovered, but a study of their practice will often give valuable hints.

The telegraph is, of course, the oldest subject dealt with, and it is a more extensive subject in England than here, several different kinds of apparatus being used. Mr. Langdon tells us that English operators ("telegraphists") read by sound from the needle instruments. Morse apparatus is used a good deal in Ireland and Bright's bell, essentially a scounder, is used in England. It is favored by the author. Telephones are now used on the main lines of most of the leading English railroads and they also have the "phonopore," an apparatus very much like the phonoplex of Edison. We do not find any statement as to how much this is used.

In block signaling apparatus Mr. Langdon describes all the principal devices, including Tyer's and Webb & Thompson's tablet and staff machines, in which block

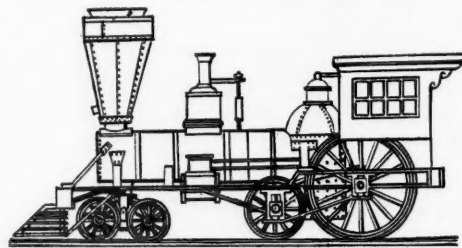
signaling is an essential function. The latest pattern of Mr. Sykes's lock and block apparatus is on the Great Eastern and this is described.

Electric lighting of passenger trains is discussed to the extent of 20 pages, and it is stated that the London, Brighton & South Coast now has 40 trains electrically lighted.

The electric light, as employed at large freight yards and in other railroad establishments, is discussed with much care and detail. The best location of arc lamps for lighting large spaces, the relative illuminating power of arc lamps at different heights and particulars of cost, from important actual examples, are given, together with comparisons of cost of gas and electric lights.

History of the Baldwin Locomotive Works from 1831 to 1897. Philadelphia: J. B. Lippincott Co., 1897; 86 pages, octavo, illustrated.

In 1881 a concise history of the Baldwin Locomotive Works was published, bringing the record up to that year. This is now republished with about 12 additional pages, giving a brief record of the work of the company down to the present time. In 1881, 554 locomotives were built, and in 1882, 563, and in that year No. 6,000 of the product of the company was completed. In 1897 the



Baldwin Fast Passenger Engine, 1848.

15,000th locomotive was built, and in that year the number built amounted to 547. The greatest output in any one year was in 1890, when 946 engines were built, and the smallest number built in any one recent year was in 1894, namely, 313. In fact we have to go back to 1885 to find so small a yearly product. The table of yearly product is really a graphical representation of the panic periods for the last 25 years.

Small engravings show characteristic or uncommon engines built by the company. Those found in the earlier pages show the progress of the art as developed especially by Mr. Matthias W. Baldwin, whose vigorous face appears in the frontispiece.

TRADE CATALOGUES.

A Simple Compound.—One of the incidents of the recent meeting of the American Railway Association in Richmond was a visit to the Richmond Locomotive Works. On that occasion the visitors were handed a little pamphlet, which the company had got up for the occasion as a souvenir, under the title of "A Simple Compound." It is a very pretty pamphlet, and shows the compounding features of the Richmond engine in two views—working simple and working compound. It gives also a brief record of the performances of the first engine to which the Richmond system was applied—namely, engine No. 140 of the Chesapeake & Ohio. According to the records this engine in 45 months, from January, 1893, to October, 1896, saved 2,289 tons of coal by comparison with simple engines of exactly the same build and service, except in the compounding feature. This engine has run continuously without any repairs to the compound feature and no shopping for adjustment or renewal of broken parts. The engine mileage amounts to 159,232 miles. The percentage of coal saving as compared with 10 simple engines was 21.2. The company claims from 20 to 30 per cent. fuel economy for its system of compounding.

Mechanical Rubber Goods.—The Peerless Rubber Manufacturing Co., 16 Warren street, New York, sends us its new catalogue, No. 24, of mechanical rubber goods, which is probably the most complete catalogue of this kind issued. The company owns and controls 41 trade marks; therefore we shall not undertake to tell specifically everything that is mentioned in the catalogue. Naturally, the well-known rainbow packing has first place. The catalogue treats beside this of the eclipse gaskets, the peerless piston and valve rod packings, the Hercules combination metallic stop valve packing, rainbow rubber and peerless leather belting; the anaconda engine and tender hose, air-brake and air-signal hose, peerless steam hose and many other specialties. The catalogue can be had on application to the above address.

Temperley Transporter and Lidgerwood Transfer. The Lidgerwood Manufacturing Co., 96 Liberty street, New York, sends a copy of the first edition of this catalogue. It is a pamphlet, 6 x 9 in., containing 48 pages with numerous half-tone and other illustrations showing the various applications of the conveying apparatus. The Temperley transporter was described in the *Railroad Gazette*, July 10, of last year. It is applicable to a wide variety of uses, from the handling of goods and coal on vessels and barges to the transfer of ores, coal and goods on wharves, docks, etc. The Lidgerwood transfer, which is quite generally known, is described and some

of its uses are well illustrated by the pamphlet. The Lidgerwood hoisting engines also receive notice.

The National Switch & Signal Co., of Easton, Pa., has issued a handsome pamphlet, showing some of the most recent designs in signaling details made by that company, which it calls a supplement to the regular catalogue of the company. It contains descriptions of the National interlocking machine, '96 model, the compensator, the special locking and other devices made by this company, and a number of photographs of signals recently put up by the National. Among these latter is a view of a junction at Seattle, Wash., which, if we may judge by the size of the tower, is an important installation.

Switches and Frogs.—The Ramapo Iron Works, Hillburn, Rockland County, N. Y., issues a new catalogue showing switches, switchstands, frogs, crossings and their parts. It is not necessary to say anything as to the quality of the work of this concern, or as to its capacity and responsibility in every way. Separate catalogues of switchstands, cars or brake shoes will be furnished on application, and either or any of them may be had by addressing the company as above.

South America, Its Resources and Possibilities.

We have received from the Gisholt Manufacturing Co., of Madison, Wis., a pamphlet under the above title, written by Mr. J. A. Johnson, President of that company, and we are informed that copies of the pamphlet can be had by applying to the company for them. To those who are interested in South America and the possible trade with that country, the pamphlet is well worth reading. It is written by a sensible and experienced business man, and is free from the fantastic theories and idle dreams with which the possibility of South American trade is often considered. Mr. Johnson was one of the party which recently visited South America under the auspices of the National Association of Manufacturers of the United States, having been selected for that purpose by the Executive Committee of the National Association of Agricultural Implement and Vehicle Manufacturers.

Mr. Johnson starts out with the proposition that the time has come for closer relations of our people with the people of other parts of the world. We must look abroad for fields of activity other than those of agriculture, and he thinks there is the possibility of a good deal of development of our trade with South America. But, evidently, he is not deceived as to the limitations or as to the difficulty of getting that trade. He suggests that our exporters have a certain disadvantage in that our people have not always been too scrupulous about keeping up the quality of goods sent abroad, and additional legislation may be necessary to prevent deception in packed meats and other goods. Furthermore, the South American people are not great consumers as compared with our own; that is, he thinks that outside of mere food supplies 30,000,000 of South Americans would probably consume about as much as 7,500,000 of our own people. They require much smaller quantities of manufactured goods than do people in cold climates; no house warming apparatus is used; a great many people go bare-foot summer and winter; comparatively little clothing and shelter is needed.

The first step in opening up this trade must be an improvement in our diplomatic and consular service. Men should be sent abroad to represent us who are qualified to represent us. They should be men of education, attainments, character and judgment, and should have adequate salaries. Such men would be of great service to our traders.

Of Buenos Ayres Mr. Johnson says that electric railroads are not likely to be used there for a long time, partly because of the narrow streets, and more because of cheap horses and cheap food. Electric lighting is being provided for by an English company under the supervision of an American engineer, who is putting in American machinery. Argentina can never be a manufacturing country, lacking fuel, minerals and skilled workmen. Mr. Johnson does not believe that its wheat growing industry can permanently compete with our own. He predicts a decrease rather than an increase in the wheat crop of that country. The yield is not large now for new soil; the ravages of the locusts are serious; hail storms are often destructive and damaging frosts are not infrequent; building timber is costly; grain storage houses are not built; wheat must be rushed to the market when harvested, and hence the price unnaturally depressed. Whether or not Argentina will ever be a good corn country is a matter of conjecture, but she might be expected to take a good deal of our manufactured products of various kinds.

Speaking of Brazil, Mr. Johnson pays his respects to the fantastic project of the Inter-Continental Railroad, which he says is "the dreamiest kind of a fancy." He considers our talk about this railroad as actually injurious to our reputation for practical sense. Brazil, of course, takes considerable railroad material from us, but the bulk of it is still furnished by the English. Very few electric street railroads will be built there, but electric lighting plants will be put in, and it is believed that we could supply steamboats to Brazil and other South American countries. We ought also to sell steam engines there.

In agricultural machinery we ought to beat the world in the South American markets. Most of the farm ma-

chinery sold there now is American, but most of the threshers and corn shellers are English. To get this special trade will require a struggle, as the English machines are known and there are large stocks of repair parts in the country. Farm wagons are little used, most of the work being done with rude carts. Probably wagons could be sold there, as also could be small farm tools. In dairy machines, Sweden and Denmark now take the lead, but our exporters are getting some of that trade. The market for fence wire ought to be large and Argentina and Uruguay should take a good many windmills. In small hardware, printing paper and shoes, we should be able to build up a trade. In textile fabrics we have injured our market by insisting upon sending American standard goods with the makers' brands. Those people want goods of lower quality, and they want to put on them the brand of the local jobbers. These are facts that our people should appreciate and meet. Another important factor is in credits; long credits are required.

We have suggested above rather than quoted, some of the things that Mr. Johnson says. The pamphlet ought to be a useful one and to do away with a good deal of misapprehension.

New Steam-Storage Motor.

The New City branch of the New Jersey & New York Division of the Erie Railroad runs from Nanuet to New City, a distance of 4.1 miles. The Erie runs a few trains between the terminal points every day, but the passenger and freight traffic is very light, and the company wishes to get a motor car which will do the work that is now being done by a locomotive, a baggage and smoking-car combined and a passenger car, which, altogether, require the services of five men. To this end a small locomotive, entirely novel in its construction, is now ready to be given a thorough trial. The motor was built at the Baldwin Locomotive Works according to the plans of the Kinetic Power Co. and weighs 29,000 lbs. The length over all is 26 ft. It resembles in appearance an ordinary street car and has a seating capacity of 20. The driving wheels are 31 in in diameter. A preliminary test showed that in running a distance of 20 miles but 30 gals. of water were used.

The water is carried in a tank beneath the car body, but enough space is left in this tank for the accumulation of a small amount of steam. Before leaving the car-house the water in the tanks is heated until the pressure of the steam is about 200 lbs., but the steam is used in the working cylinders at a much lower pressure. In order to keep up pressure a fire in a small firebox is kept burning in one end of the car in order to generate a constant supply of steam, keeping the pressure in the tank from 150 lbs. to 200 lbs. per square inch. We hope to be able to give further particulars later.

The National Rail Clip.

The National Switch & Signal Co., of Easton, Pa., has issued a circular describing Hansel's patent "'97 Model" rail clip for detector bars, from a photograph in which we have traced the accompanying drawings.

The clip shown in Fig. 2 has but two points of contact with the rail outside, and these points are on adjustable screws, which make it possible to fit the clip to any width of base, thus avoiding the use of washers either on the detector bar stud or the pin holding the bottom end of the

Fig. 1.—National Rail Clip, with High Fulcrum.

link is supported on the outer end instead of being riveted into the casting. The stud in the detector bar is not provided with a cotter, this being deemed unnecessary.

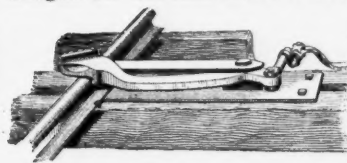
These clips have but three points of contact—two on the outside and one on the inside—thereby securing the best form of adjustment to avoid slipping. The clip shown in Fig. 1 has been designed to meet the wishes of signal engineers who desire to have the pivotal point of the link above the base of the rail, so that it will be kept free from ice or frozen ground. The general design of this clip is the same as that of Fig. 2, and although the link is short, it is fastened direct to the rail, the same as ordinary clips, so that the assistance of the section force is not required to apply or change it, as is the case where the clip is fastened to the tie.

The makers prefer the longer link, although, of course, it cannot be used unless it extends below the

base of rail. Where the full stroke of the pipe line is needed to throw the bar, the danger of buckling the pipe with a train on the detector bar is with a long link reduced to a minimum, whereas with a shorter link the lost motion or buckling in the pipe line is not so forcibly indicated in the movement of the detector bar.

The National Derailer.

The accompanying illustration shows a simple derailing device for the protection of grade crossings and drawbridges, lately brought out by the National Switch & Signal Co. The construction of the apparatus and the



manner of operation being clearly shown in the engraving, no further description is needed. In

connection with this picture, Mr. Hansel, Vice-President of the National Company, has handed us a brief essay on the importance of the function performed by the derailing switch, from which we quote the following paragraphs:

Many railroad officials and signal engineers have been in doubt as to the advisability of introducing derails into high speed routes, claiming that since the derail is a facing point switch it is primarily dangerous; and, further, that the derailing of a train may be productive of greater danger than a collision. The writer has always contended that since we cannot depend upon the engineer observing the signals and governing his action accordingly, we must provide some physical protection, and it has been demonstrated that the introduction of the derail in connection with semaphore signals acts as a moral agent, insuring to a great degree against the failure of an engineer to obey signals, and if he disobeys the signals prevents collision.

It is true that in some cases, even with an open derail before him, the engineer will disobey the signal and hazard his own life and the safety of the passengers. The act of the engineer under these conditions is unaccountable. There have been several instances where engineers have run their train into an open draw in broad daylight, and if they lived to tell the tale were unable to explain why they did it. It, therefore, appears that the best contrivance introduced by a careful railroad manager will not give him the assurance that the passengers committed to his charge are at all times protected from the carelessness of his employees. At the same time the greatest measure of safety possible should be secured, and where derails are introduced they should be at a sufficient distance from the crossing to prevent derailed train from reaching the crossing when ground is frozen.

The early practice in the location of the derail fixed the distance at 300 ft. from the crossing. Operating officials did not consider it safe to run passenger trains over a crossing at a speed to exceed 20 or 25 miles an hour. The general rules issued to engineers were to slow down to a speed of about 25 miles an hour for all grade crossings, whether protected by signals or not. As the public demanded more rapid transportation the practice of running crossings at higher speed gradually prevailed, until now it is not uncommon to find trains passing over a grade crossing equipped with signals at a speed of 60 miles an hour, and where it is the practice to permit such high speeds, the derail should be placed at least 500 ft. from the crossing or drawbridge which it protects.

Following the Atlantic City disaster, the writer was requested by the Signal Committee of a Railroad Association to give his opinion as to the proper method of locating and installing a derail, and in reply to this request the following general requirements were set forth:

The derail for passenger trains should be not less than 300 ft., and generally 500 ft., from the crossing, and where the track is carried on an embankment guard rails should be introduced, extending to within 150 ft. of the crossing, in order that a derailed train might not be capsized. The space between the guard rail and the traffic rail should be filled with loose sand so as to offer the greatest impediment to the forward movement of the derailed train. Errors of the operator should be guarded against by the introduction of electric locking, which should be so arranged as to make it impossible to change a signal from safety to danger immediately in front of an approaching train.

Electric locking is very simple and considering its economical installation provides the greatest measure of safety and also insures against conflicting testimony when an engineer has disobeyed his signals, for with electric locking it is impossible for the operator to change the derail from safety to danger, unless he breaks the circuit, intentionally, by a contrivance within the signal tower so designed as to record such action, or until the train which has accepted the clear signal has passed over and beyond the crossing. It is now considered, by a majority of signal engineers, that no grade crossing can have the greatest measure of protection unless it is equipped with electric locking. Had the crossing at Atlantic City been provided with derails located 500 ft. from crossing, together with the proper guard rails and electric locking, it is difficult to see how the accident, which was attended with such frightful loss of life, could have occurred.

The efficiency of the derail has been lately demonstrated at South Norwalk, on the New York, New Haven & Hartford. On Oct. 26 train 84, which leaves New York at 11 p. m., passed the home signal at South Norwalk at danger and was derailed. The engine and three cars were derailed and the engine thrown down the embankment. The engineer, who has heretofore borne an excellent reputation for careful handling of his train, claimed that the signal was clear, and since the distant signal cannot be cleared until the home signal is clear, he assumed that the home signal was clear. After the derailment had occurred the signals were examined and found to be at danger. The derail at that point is situated 780 ft. in advance of a drawbridge, which is about 40 ft. above water. If a canvass had been made among the passengers of this train it would have been found that all were thankful that a derail had saved them from being carried into the open draw.

This case presents a strong argument in favor of the derail, for even though the train was going at good speed and there were no guard rails, the engine did not travel more than 200 ft. after it left the derail, and none of the passenger cars were derailed.

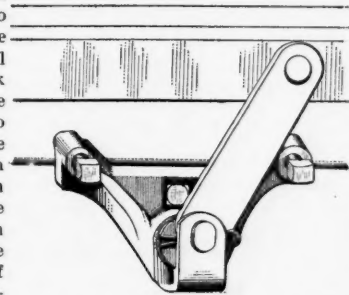


Fig. 2.—National Rail Clip, with Low Fulcrum.

How the Arlberg Tunnel is Cared For.

The Arlberg tunnel, which is 6½ miles long and 4,237 ft. above sea level, has a special staff for its maintenance and inspection, with an engineer at its head, under whom are two roadmasters (called "tunnel masters"), 11 tunnel watchmen and two working parties, each consisting of 20 to 25 men. The tunnel masters have alternately a week of inside and a week of outside service, changing every Monday morning. The one having the inside service must be at one or the other entrance at six o'clock in the morning when the working party goes in, in order to see that it goes to work at the proper time and to give any orders necessary. Every day he must walk through the tunnel from one end to the other to supervise the service of the watchmen and the working parties, inspect the lining of the tunnel and the track, observe and record the readings of the barometers and thermometers in the two large tunnel chambers, and examine the service books of the watchmen. He must remain a considerable time with parties at work and oversee their performance.

The tunnel master in outside service must ride through the tunnel at night on some train two or three times in the week to check the watchmen, and especially pay attention to those who guard the entrances, who are also inspected by the master serving inside.

In the last third of the month, special inspections by one of the tunnel masters are made with instruments and other appliances to ascertain exactly the line and surface of the rails, and the effectiveness of all appliances, torpedo signals, etc. At longer intervals the masonry, etc., is inspected, a special platform on a car being provided, to make possible a close inspection of the higher parts of the tunnel.

The tunnel watchmen have their quarters, five at each end of the tunnel. Each watchman has a tour of three weeks of tunnel service, followed by two weeks of portal service, one of the latter by night and the other by day. The inside watchmen are started one from each portal at the same time, and at such intervals that the one going out meets one coming in within about a mile of the portal toward which he is going. They have seven hours of service followed by 11 hours' rest. Each watchman goes half-way through and then returns, and makes the half length of the tunnel in three hours, moving thus at the rate of a mile an hour. He reports to the station man on duty at his end of the tunnel, both before entering and on coming out, and is informed by him, when necessary, of any change in train movement or other occurrence in the operating department, which he should know. The watchman when in the tunnel carries a signal lantern, a signal horn, a torpedo gun with eight cartridges and a wrench. He is also provided with a sponge to breathe through should the smoke be bad. He follows one track going in and the other going back, and observes any changes in the track, whether any large stones lie too close to the rails or on them. He is ordered to examine particularly any work which is being prosecuted in the tunnel. Moreover, especially if the air is comparatively pure, the watchman is to observe the revetments and arch of the tunnel, and see if any where fragments of stone or mortar have fallen from them. Should he find any fragments on the roadbed which he may suspect to have fallen from the lining, he must place them in the nearest niche and report to the tunnel master exactly where they were found.

The watchman also examines the lanterns at every kilometer post and keeps them in order, inspects the bell signals and reports if they are out of order; notes once daily the number of any working party he meets, the place where they were employed and the nature of their work, and whether they have put out proper signals against trains. If he meets any unauthorized person in the tunnel he must bring him out immediately and deliver him to the traffic officer for prosecution. When a train passes through he must look to see if it gives signals, or whether anything is the matter with it likely to be dangerous; if so, to signal it to stop, both with horn and lantern.

When the two watchmen meet in the middle of the tunnel they rest in a chamber there for an hour and exchange information and service books, in which they are required to note the condition of the atmosphere in the tunnel, the time when any signal may have been heard, the point where a train passed, etc., etc.

TECHNICAL.

Manufacturing and Business.

The New York office of the Adams & Westlake Co., of Chicago, representing the railroad and brass departments, has been removed from 115 Broadway to the Havemeyer Building, 26 Cortlandt street.

The following companies are reported as being in the market for rails: Tallahassee Southeastern Railroad, 13 miles of 56-lb. rails and fastenings; Ripetto Lumber Co., Belva, W. Va., 10 miles of 25 or 30 lb. rails, and the Reed Brick Works, Abbeville, Ga., some 30-lb. rails.

The American Steel Foundry Co., of St. Louis, has received orders for its American bolsters from the Kansas City, Pittsburgh & Gulf, 400; Colorado Midland, 200; Northern Pacific, 100, and Missouri Pacific, 27.

The Indiana Steel Castings Co., of Montpelier, Ind., which recently commenced the manufacture of open hearth steel castings at its new plant, will make a specialty of car couplers.

The works of the Berlin Iron Bridge Co., East Berlin,

Conn., are now running on a schedule of 10 hours a day, an increase of two hours a day over the previous schedule. The company has a contract for furnishing for the government of Limon, Costa Rica, a market building to be constructed entirely of steel.

W. E. Clark has been appointed New England Representative of the Standard Steel Works, of Philadelphia, for the sale of tires and steel tired wheels, with office at 8 Oliver street, Boston.

The Acme Journal Bearing Co., of Chicago, has recently been incorporated, with F. W. Thayer President and William Hamilton Secretary and Treasurer. Its office and foundry is at 7 and 9 South Jefferson street.

John Hawkes, who was for a number of years associated with the George Burton Co., of Cincinnati, and who left to join the E. D. Albro Co., is again with the Burton Co.

The Drexel Mfg. Co., of Chicago, has completed arrangements with the National Malleable Casting Co. for the manufacture of the McCord malleable journal box and lid.

On May 10 application will be made to the Governor of Pennsylvania for a charter for "The Philadelphia Bridge Works." The incorporators are Francis H. Saylor, George W. Corbett, Livingstone Saylor, J. Edward Challenger and Michael F. X. Foley.

The final test of the new machinery of the Keystone Axle Co., Beaver Falls, Pa., was made last week and a number of heavy car axles were successfully turned out. The plant will shortly be put in operation.

Jonathan Clark & Sons, General Contractors, Chicago, have the contract for the building of a new reservoir in Highland Park, Pittsburgh, which will provide additional water facilities for the city. The approximate

work at once on a new station at Moncton, N. B. The contract price is given as about \$40,000.

The Burlington, Cedar Rapids & Northern will build a new freight depot at Cedar Rapids, Ia., this year. It will cost about \$7,000 and be 200 x 30 ft. in size.

The Union Pacific has begun work on a new freight depot at Greeley, Col. The building will be of stone and brick.

The contract for the new shops of the Georgia Southern & Florida, at Macon, Ga., has been given to Nicholas Ittner, of Atlanta, the contract price being about \$30,000. The new buildings will comprise a machine shop, 90 x 160 ft., a blacksmith shop, 45 x 120 ft.; a roundhouse, 70 ft. deep, with eight stalls; an engine-room, tool-room, pattern shops, and other smaller buildings. The buildings will be brick, with steel truss roofs, and the flooring will be vitrified brick, laid in cement. There will be a transfer table between the machine shop and blacksmith shop. Work was begun on April 14, and will be completed about Oct. 1. The buildings will be located on the present shop yard, where there are already store-houses and offices.

The Louisville & Nashville has received bids from various contractors for a new passenger station at Montgomery, Ala. The present train sheds will be used and the new station building proper will cost approximately \$100,000. It will be a four-story structure of pressed brick with stone trimmings and terra cotta ornamental work about the entrance. The plans provide for two separate buildings at either end of the station, one for baggage and one for mail and express matter.

Prussian Locomotives.

The following are official figures of the weights, speeds, cylinder diameter, etc., of the various classes of locomotives on the Prussian government railroads:

	No. axles.	Diam. dr. wheel. In.	Cylinder diam. In.	Stroke. In.	Speed per hour. Eng. m.	Heating surface. Sq. ft.	Grate surface. Sq. ft.	† Weight in Ger. tons.	
								Ready for service.	Empty.
Exprs. pass.....	4	77	11 9	16.4	56½	1,639	24.7	48.25	.....
Ord. pass.....	3	77	11.5	16.4	56½	1,249	22.3	39.7	36.1
Freight.....	3	68	11.8	15.3	56½	1,368	20.1	35.7	31.4
*Shifting.....	3	52½	12.5	17.2	28½	1,639	16.5	38.5	33.1
*Freight.....	2	42½	9.	15.	28½	761	10.8	27.5	20.7
*Secondary.....	3	52½	11.9	17.2	28½	1,276	14.2	31.9	31.
"	2	42½	7.5	15.	28½	87	8.33	20.5	15.6
"	3	42½	12.1	15.	28½	801	14.	29.2	21.9

* Tender engines.

† The German or metric ton is 2,205 lbs. Av.

cost of the work will be \$500,000, and it is to be completed within one year.

N. W. Boyd has been appointed Superintendent of the works of the New York Switch & Crossing Co., of Hoboken, N. J. Mr. Boyd was until recently connected with the frog and switch department of the Carlisle Manufacturing Co.

The foundry of the J. B. & J. M. Cornell Iron Works will be removed from New York City to Cold Spring, N. Y. The finishing shops will remain in this city.

L. Oberauer has been appointed Mechanical Engineer for the Schoen Pressed Steel Co. of Pittsburgh. Mr. Oberauer was formerly connected with the United States Car Co.

H. O. Hukill, Purchasing Agent of the Pennsylvania Lines West of Pittsburgh, Pittsburgh, Pa., announces that the Newport & Cincinnati Bridge Co. has on hand about 2,000 tons of superstructure, consisting of six spans, measuring from 133 ft. to 415 ft., recently removed in the reconstruction and enlargement of the bridge, which he will sell for re-erection or as scrap.

At the annual meeting of the stockholders of the Gold Car Heating Co., held at the office of the company, Frankfort and Cliff streets, New York, April 13, the following officers were elected for the coming year: President, Edward E. Gold; Treasurer, William E. Banks; Secretary and Secretary, C. W. Osborne. The President reported an increased business during the past year. A quarterly dividend of 7½ per cent. was paid. In addition to a largely increased trade in the United States the Company is now doing an extensive foreign business.

Iron and Steel.

The Bellaire Steel Co. has given a contract to the Bellaire Boiler & Bridge Co. for two new 10-ton cupola furnaces.

The Hamilton Iron Co. has been incorporated at Superior, Wis., with a capital stock of \$75,000, by A. C. Titus, J. R. Hile and W. R. Tabri.

Rosena furnace, which for some time has been operated under lease by M. A. Hanna & Co., of Cleveland, O., will revert to its owners, the Oliver & Snyder Steel Co., of Pittsburgh, on May 1.

At a meeting of the stockholders of the Pottstown Iron Co. held recently, it was decided to increase the capital stock of the company by the issue of \$200,000 first preferred 7 per cent. cumulative stock, and by \$1,100,000 second preferred 5 per cent. cumulative stock.

The Central Iron & Steel Co., of Harrisburg, was incorporated on April 20. The company is capitalized at \$1,000,000.

New Stations and Shops.

It is stated that the Intercolonial Railway will begin

It might be well to add to these figures the prices of some of these machines:

Passenger engine with tender, hand and air-brake, about.....	\$13,333
Six-wheel coupled freight engine with tender, about.....	10,238
Four-wheel coupled tender engine, seven tons per wheel, about.....	6,667
Six-wheel coupled tender engine, seven tons per wheel, about.....	8,570
Six-wheel coupled tender engine, five tons per wheel, about.....	6,667

Goodwin Dump and Ballast Cars.

We have received from the Goodwin Car Co. the following notes of certain exhibitions of the performance of the Goodwin cars as given for the information of the Pittsburgh & Lake Erie Railroad.

Mr. Edwin F. Wendt, Assistant Engineer of the road, made all arrangements permitting the cars to be loaded promptly and dumped at places accessible to interested parties.

No. 1.—Dumped slag, very sticky material, April 3. It took six men four hours to load our two cars from Erie cars. We dumped the loads in six seconds; clean.

No. 2.—Dumped bituminous coal at McKee's Rocks, April 6: clean, quick dump, part by hand and part by air to show working of car.

No. 3.—Dumped ashes for ballast, going 16 miles an hour. Also dumped same material standing still by hand and by air Wednesday, April 7, most successfully; clean work.

No. 4.—Dumped crushed limestone at the Ohio Iron & Steel Co., Lowellville. Used both hand and air power; April 9. Clean dump, about five seconds.

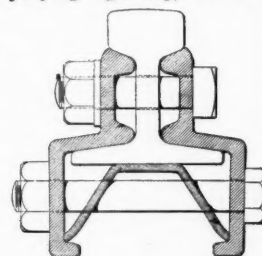
No. 5.—Same as No. 4, given at the Brier Hill Iron & Steel Co.'s; April 10.

No. 6.—Same as No. 5; April 12.

These exhibitions were seen by many railroad officers.

The Villenoweth Rail Joint.

Mr. H. Villenoweth, of Philadelphia, has designed an improvement in rail joints which is shown in the accompanying engraving, which is a sectional view made from



a model, and is only approximately to scale, but shows the essentials well enough. It will be seen that he has adopted the plan of having dependent flanges which go down between the two joint ties. Between these flanges he places the bent plate which engages with them and which is brought up in contact with the base of the rail. The flanges are drawn together by two bolts one of which is shown in elevation in our view. Otherwise there is no peculiarity about the joint. It is proposed to use 24-in. joints with the reinforcing plate 10 in. long.

500,000 Freight Brakes.

Last week the Westinghouse Air-Brake Co. passed the half million mark in the manufacture and shipment of freight train brakes. The company has now sold 503,519 sets of automatic air-brakes for freight cars. This num-

ber would equip about three-sevenths of all the freight cars in service to-day in the United States. When we look back to the exciting struggles of 1887, 1888 and 1889 over the questions of the wisdom of using any continuous brake on freight trains, and of the kind of brake to be used, the work done by the Westinghouse Company in the last 10 years seems really wonderful. In the report of the Interstate Commerce Commission for 1889, we find the first summary of brake equipment, and there it is stated that on Jan. 30, 1889, there were in service 66,513 freight cars with automatic brakes. Three years later this number had risen to 160,256, and in another three years it was 295,073.

Compound Compressed-Air Locomotive.

The Baldwin Locomotive Works are building a compound compressed-air locomotive to be used at the Alaska Colliery of the Philadelphia & Reading Coal and Iron Co. The air will be compressed by a three-stage Norwalk compressor. A "standard line" pipe 2,680 ft. long and guaranteed to stand a pressure of 1,000 lbs. per square inch will extend through the mine and serve as a reservoir for the storage tanks on the locomotive, and provision will be made so that these may be charged from the long pipe in two or more places in the mine. The locomotive cylinders are 5 and 8 in. x 12 in., and the valves, ports and connections are of the same general type as are in use on the Vaucain compound locomotives. The driving wheels will be 24 in. in diameter, wheel base 4 ft. 6 in., and the track gage 3 ft. 8 in. The air will be stored at a pressure of 600 lbs. in three reservoirs having a total capacity of 170 cu. ft. The working pressure of the air in the high pressure cylinder will be 200 lbs., and the cut-off will take place at one-half stroke. The height will be 5 ft. 3 in., width 6 ft., length over all 16 ft., and the distance between drivers 4 ft. 6 in. No reheater of any kind will be used.

The New Bradley Polytechnic Institute.

Jonathan Clark & Sons, general contractors, Chicago, have secured the contract for the erection of the Bradley Polytechnic Institute buildings, at Peoria, Ill., which will cost approximately \$115,000. The architect is Mr. Henry Ives Cobb, of Chicago. This is a new institution, endowed by Mrs. Lydia Bradley of Peoria, and will be a school for manual training. The workshops will be located in the basement and occupy one-story wings 40 ft. front by 135 ft. deep on either side of the main building, which will be 160 ft. front by 65 ft. deep and three stories high. At the rear of the main buildings, on the second floor, will be an auditorium 56 ft. by 60 ft.

The building is to be of fireproof construction throughout, faced with Bedford stone and finished inside with oak and yellow pine. The contract provides that the work be completed by Oct. 1.

Block Signaling.

The Chicago, St. Paul, Minneapolis & Omaha is to adopt the block system on its line (single track) between Elroy, Wis., and St. Paul, Minn., 198 miles. An order has been given to Mr. Sperry, Western agent of the National Switch & Signal Co., for the semaphore signals necessary. On this road, as on the Chicago & Northwestern, fixed signals are arranged to show at night green for all-clear and red for stop.

European Bearing-Metal Proportions.

It may be useful to note the proportions of the bearing metals made and used by various railroads and navies of Continental Europe; the following table is given on the authority of Mr. Hubert Joly:

	Tin. %	Antim. %	Lead. %	Copper %	Zinc. %
German Imperial Navy	85	7½	.....	7½	.....
French	7½	.....	4	.....	81½
Saxon State Railroad.	86	9.3	.....	4.7	.....
Berlin-Stettiner R. R.	.....	.....	.....	.....	.....
(a) Locomotives.....	82	11	.....	7	.....
(b) Cars.....	42	16	42	.....	.....
Hanoverian R. R.	86.8	7.6	.....	5.6	.....
Bavarian State R. R.	90	8	.....	2	.....
Berlin-Hamburg R. R.	20	21	69	.....	.....
Austrian N. W. R. R.	82	12	.....	6	.....
Stettiner Vulkan.....	45	10	45	.....	.....

*For stuffing boxes.

THE SCRAP HEAP.

Notes.

The New York Court of Appeals has reversed the decision of the lower courts in the suits involving the personal property taxes of the Manhattan Elevated Railroad for the year 1895, and the attorney for the road states that probably the money paid for 1894 and 1896, as well as that for 1895, can be recovered. These taxes amount to about \$300,000 a year.

The Supreme Court of the United States has affirmed the decisions of the lower courts in the case of James Lemon, the locomotive engineer who, in 1893, was fined \$50 for contempt of court in refusing to move a freight train of the Lake Shore & Michigan Southern in which were cars destined for the Ann Arbor Railroad, on which there was a strike, with which Lemon sympathized.

A law has been passed in Pennsylvania requiring all railroad and telegraph companies to make annual reports to the Bureau of Railroads. In Michigan a free bicycle law has been passed by the lower House of Legislature; a bill regulating freight rates was still pending at last accounts. In Minnesota the Senate has rejected a bill for the adoption of the Iowa railroad law; a bill to compel express companies to report their earnings to the Railroad Commission has been passed. In Delaware the legislature is considering a bill for the establish-

ment of a railroad commission, to consist of one member from each county.

The flood in the Mississippi River continues and its crest is now below Vicksburg. Between Memphis and Vicksburg, over 200 miles, the Yazoo & Mississippi Valley road has practically suspended business. About 300 miles of this company's line was submerged, but the extent of the damage to the roadbed has not yet been definitely ascertained. The Louisville & Nashville has been generally free from interruption by floods, except that on the Memphis division the Tennessee River at one point rose to such a height as to necessitate a suspension of traffic for 12 days. Floods in the Missouri Valley and in Southern Iowa caused considerable damage to railroads, and it is said that in the latter region some bridges were carried away. The Northern Pacific main line bridge at Mandan, N. Dak., was impassable for nearly a week, the approaches being submerged.

An Inter-Oceanic Railroad in Honduras.

In our issue of Jan. 15 we noted the incorporation of the Honduras Syndicate for the purpose of obtaining concessions and grants of land from the Honduras government for the operation of railroads. Dispatches from Tegucigalpa, via Galveston, Tex., under date of April 9, state that the Honduras Congress has decided to grant the syndicate a concession to build a railroad from Puerto Cortez, on the Gulf of Honduras, southeast to Amapala, located on an island in Fonseca or Conchagua Bay, a distance of about 180 miles.

The Scotch-Irish Tunnel.

The interest in the old schemes for a tunnel between Ireland and Scotland is being revived, particularly in Ireland. Several plans have from time to time been advocated with a view to uniting the two countries, and the reception accorded these schemes affords no hope that any of them will ever be realized. It is essentially a matter of finance, it being questionable whether the traffic would be sufficient to enable a return to be made on the enormous capital which would be required. Altogether six routes have been suggested, and the estimates run from £6,000,000 to £16,000,000. It must be confessed that the outlook for such an enterprise is not brilliant, and that any project would meet with great opposition from the port and other interests likely to be prejudicially affected.—*Transport.*

Three-Cent Fares in Indianapolis.

The day on which the three-cent fare law went into effect in Indianapolis, April 15, proved to be one of intense excitement, the Citizens' Street Railroad Co. having decided to ignore the law. The conductors continued the rule of collecting five cents from each passenger. On Thursday, the 15th, passengers in all parts of the city offered the conductors the sum of three cents and refused to pay more. Many of them were ejected and there was trouble all over the city. On Friday companies of 10 and 20 citizens took pains to board cars in a body, all determined to pay no more than three cents, and when the conductor tried to eject one the whole crowd resisted him. In one case a passenger was kicked and there came near being a riot. In the afternoon, after a conference between the Mayor and President Mason, the latter ordered the conductors to accept three cents until the decision of the suit to test the validity of the law which has been entered in the courts. Indictments were returned on Saturday last by the Grand Jury against President A. L. Mason, Superintendent Miller Elliot, a dozen conductors and other officers of the Citizens' Street Railway Co. for violation of the law.

Sale of New York State Canal Improvement Bonds.

On April 20 State Controller Roberts received twelve bids for \$4,119,000 in answer to his advertisement for the sale of \$3,000,000 3 per cent. gold non-taxable canal improvement bonds. The awards were \$2,688,000 to Harvey Fisk & Sons, New York, at 101.379; \$6,000 to C. S. Byington, Albany, at 102; \$6,000 to Maclay & Davies, New York, at 101.50; \$300,000 to Blair & Co., New York, at 101.75.

The Fairport Docks.

As already announced, the Baltimore & Ohio has made two lake connections, one to Duluth by the Northern Steamship line, and the other to Chicago and Milwaukee, by the Owen line, both from Fairport, O. Fairport is the Lake Erie terminus of the Pittsburgh & Western, which is controlled by the B. & O. For some years the Fairport Warehouse & Elevator Company, which owns the docks at that point, has been putting the plant in condition to handle a large traffic. The docks are 1,200 ft. long and on them are two steel frame iron-sheathed warehouses, each 465 x 90 ft. with a capacity of 150,000 bbls., and there is, in addition, a grain elevator holding 1,000,000 bu. The channel is being dredged from the mouth of the river to the docks, and, when completed, a depth of 18 ft. of water will be maintained. The Fairport terminal was opened for lake and rail traffic on April 15, 1891. From 1891 to 1895 there were handled 283,700 tons of eastbound and 129,562 tons of westbound package freight, or a total of 413,262 tons for the five seasons, an average of 82,652 tons a season. Last year there were handled 132,264 tons of eastbound and 21,879 tons of westbound package freight, showing an increase of 87 per cent. over the average for the previous five years. From 1891 to 1895 the total grain handled was 2,744,372 bu., but in 1896 there was handled 8,162,862 bu., or over 11 times more than during the previous five seasons.

A Lecture on Signaling.

Mr. Charles Hansel, Vice-President and General Manager of the National Switch and Signal Co., delivered a lecture at Cornell University on the 16th on "Safe Railway Operation and the Advancement in the Art of Signaling and Interlocking." The lecturer illustrated his remarks by lantern slides, a full-size four-lever interlocking machine, and two regular train staff instruments, as well as other details.

South American Notes.

A company has been organized at Pará, Brazil, for establishing a line of steamships between that port and Santos. The company has four steamers of 1,500 tons burden each.

The Peruvian government has canceled its concession to Maj. Alfred F. Sears for the irrigation of the Valley of Piura. The government has waited five years for the commencement of operations, but the capital could not be raised. In addition to a monopoly of water rights over large areas, adapted to the culture of cotton, there were included the right to build certain railroads and port works at Secura. It is said that the contract will now most likely be given to the Peruvian Corporation, Limited.

There is no longer any doubt about the speedy construction of a grand central station for all railroads entering Buenos Ayres. The old building has been destroyed by fire, and the government has issued a decree relating to a new structure which all the railroads will be bound to use. The amount authorized for the building and lines of access to it is \$5,000,000 gold, which sum is to be raised by the sale of post lands or by issuing a 4½ per cent. loan. Tenders are called for, which must be handed in to the Department of Public Works within 120 days from the 22d of March.

The Pennsylvania's New Ferryboat.

The contract for the new ferryboat, which is to be built for the ferry of the Pennsylvania Railroad between Twenty-third street, New York City, and Jersey City, has been awarded to The Charles Hillman Ship & Engine Building Co., Philadelphia, who also built the St. Louis for the same ferry. The new boat, the third on this line, will be named the New Brunswick, the old New Brunswick, which was burned last fall, having been disposed of.

Foreign Officers of Japanese Railroads.

Mr. F. H. Trevithick, who was appointed Locomotive Superintendent of the Japanese State Railroads in September, 1876, severed his connection with the Japanese government on the 31st ultimo. He has been in Japan 20½ years. Mr. A. S. Aldrich, who was secretary of the State Railroads, left at the same time after 25 years' service. Both these gentlemen have actively assisted in the enormous development which has taken place in recent years of the Japanese railroad system, though for the last few years their position has been only that of advisory experts. There are now only three foreigners left in the Japanese government railroad service.—*Railway Engineer.*

LOCOMOTIVE BUILDING.

The Spokane Falls & Northern has received the last of five new locomotives from the Baldwin Locomotive Works.

We have recently noted several small orders for locomotives placed with the Brooks Locomotive Works, of Dunkirk, N. Y., by various roads. We now give a list of engines now under construction at those works: 21 engines for the Mexican Central, four for the Koya Railway of Japan and four for the Louisville, New Albany & Chicago which we have previously described; three 18 x 26 in. American type passenger locomotives for the St. Lawrence & Adirondack; two 10-wheel passenger locomotives for the Burlington, Cedar Rapids & Northern, with 18 x 24 in. cylinders and three Mastodon type freight locomotives for the Buffalo, Rochester & Pittsburgh, with cylinders 21 x 26 in. The three moguls for the Pittsburgh, Bessemer & Lake Erie will have 20 x 26 in. cylinders. In addition to several other smaller orders the works are now building five locomotive boilers for the Minneapolis & St. Louis and two for the New York, Chicago & St. Louis.

CAR BUILDING.

The Wilmington & Northern has placed an order with the Harlan & Hollingsworth Co., of Wilmington, Del., for 200 gondola cars.

The Union Pacific, Denver & G-I last week received from the St. Charles Car Co. 50 narrow gage gondola and two passenger cars.

It is stated that the Mt. Vernon Car Manufacturing Co. has received an order from the Louisville, Evansville & St. Louis for 100 coal cars.

The Imperial Chinese Railway Administration is in the market for 10 passenger and 16 freight cars for the Sung-Wu Railway. These are referred to in another column.

The through coaches of the Baltimore & Ohio Southwestern, which are used between the west and Baltimore & Ohio points, are to be painted royal blue, the new standard color of the Baltimore & Ohio. The rest of the passenger equipment will be the standard Pullman color.

Toward the latter part of the month the Pennsylvania Company expects to commence building, at its Fort Wayne shops, 200 gondola cars to fill vacant numbers in the equipment. The cars will be equipped with Janney couplers, Westinghouse air brakes and National hollow brakebeams.

The 280 box cars for the National Linseed Oil Co., which are now under construction at the works of the Missouri Car & Foundry Co., will be equipped with cast steel truck and body bolsters made by the Shickle, Harrison & Howard Iron Co., of St. Louis. A small part of the order has already been delivered.

It is stated that the Summerville street railroad is in the market for equipment. P. H. Gadsden, 43 Broad street, Charleston, S. C., should be addressed.

BRIDGE BUILDING.

Allentown, Pa.—The County Commissioners have awarded to Pascoe & Crilly, of this city, the contract to build the two new iron bridges over the Jordan Creek, in Lowhill Township. The price for both the 72-ft. and the 127-ft. bridges is \$4,165, including foundations and superstructure.

Belton, Tex.—It is proposed to build a 200-ft. highway bridge here this spring. E. T. Rucker, City Engineer.

Boston, Mass.—Sealed bids for building eight spans of steel superstructure for Charlestown bridge will be received by the Boston Transit Commission, at 20 Reacon street, until April 28. Notice to contractors, bid, contract, specifications and bond can be obtained, and plans can be seen, at the office of the City Engineer, City Hall, Boston. George G. Crocker, Chairman.

Ithaca, N. Y.—Plans and specifications have been prepared for an iron bridge over Fall Creek, and bids will be asked at once.

Loveland, O.—Bids are asked May 1 for the superstructure of a bridge over the Miami River at this place. Fred Bader, Chairman Board of County Commissioners, Cincinnati.

McKeesport, Pa.—Arrangements have been completed by the Second Avenue Traction Co. to build a viaduct over the Pittsburgh, Virginia & Charleston at Dravosburg, at a cost of \$50,000.

Montreal, Que.—At the annual meeting of the Canadian Pacific it was decided to expend \$1,165,723 in building permanent bridges and making other improvements.

New Brighton, Pa.—The directors of the old Brighton bridge, between this place and Beaver Falls, will submit a proposition to the stockholders at their annual meeting on April 26 to replace the old wooden structure with a new iron one at a cost of probably \$60,000 or \$70,000.

New York.—The Senate has passed a bill providing for a bridge over the tracks of the New York & Harlem and the Port Morris Branch of the same road connecting Melrose avenue from East 163d street to the junction of Webster avenue and Brook avenue at 165th street in this city.

The commission appointed for the appraisal and condemnation of land necessary for the approaches for the bridge across the Harlem River, to connect First avenue, on the south, with Willis avenue, on the north, has completed its hearings, and is now at work upon the report which, under the act of the Legislature authorizing the construction of the bridge, must be submitted to the Appellate Division of the Supreme Court before the municipal authorities can acquire land for the approaches and go on with the work. Because it is believed to be impossible to prepare the report for the Court to receive and dispose of it in time to begin work this season, a bill has been introduced in the Legislature amending the law in a manner that will permit the Department of Public Works to commence work at once and to complete the bridge as early as possible.

The question of the southern approach to the new bridge across the Harlem River at Third avenue has been settled by the Board of Estimate and Apportionment authorizing General Collis, Commissioner of Public Works, to build an approach, conforming to a plan presented by Chief Engineer Birdsall, which provides for an approach in the shape of a horseshoe on the east side of Third avenue, for the acquisition by the city of the lots fronting on that side of the avenue from 125th to 130th street, and for a small park within the horseshoe near the bridge.

Ottawa, Ont.—The Dominion government will build a new steel swing bridge across the canal at the end of Concession street, Ottawa, and will renew the superstructure west of Port Dalhousie, at a cost of \$20,000.

Quebec, Que.—The City Council has decided to build two bridges at Victoria Park at a cost of \$27,000, and a new steel pontoon for \$8,000.

Rome, N. Y.—The Council Committee on Highways and Bridges has been authorized to advertise for bids for the Humiston bridge.

Toronto, Ont.—The time for receiving the tenders for two steel bridges carrying the Grand Trunk and one steel bridge carrying the Canadian Pacific over Queen street subway has been extended until May 13. For particulars address R. J. Fleming, Chairman Board of Control, City Hall.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cincinnati, Sandusky & Cleveland, 3 per cent. on preferred stock, payable May 1.

Lake Erie & Western, quarterly, 1½ per cent., payable May 15.

Manchester & Lawrence, semi-annual, 5 per cent., payable May 1.

Nashville, Chattanooga & St. Louis, quarterly, 1 per cent., payable May 1.

Pullman Palace Car Co., quarterly, \$2 per share, payable May 15.

Brooklyn (N. Y.) City, quarterly, 2½ per cent., payable April 15.

Cleveland (O.) City, quarterly, ¾ per cent., payable April 10.

Columbus (O.) Street, 1 per cent., payable May 1.

Consolidated Traction (Pittsburgh, Pa.), 8 per cent. on preferred stock, payable May 4.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Burlington, Cedar Rapids & Northern, annual, Cedar Rapids, Ia., May 25.

Central Railroad of New Jersey, annual, Jersey City, N. J., May 1.

Chateaugay, annual, Plattsburgh, N. Y., May 29.

Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 5.

Delaware & Hudson Canal Co., annual, 21 Cortlandt street, New York, May 11.

Delaware, Maryland & Virginia, annual, Georgetown, Del., May 26.

Elmira & Lake Ontario, 20 Whitehall street, New York, May 6.

Flint & Pere Marquette, annual, Saginaw, Mich., May 19.

Lake Shore & Michigan Southern, special, Cleveland, O., and Erie, Pa., May 20.

Louisiana & Missouri, annual, 216 N. Broadway, St. Louis, Mo., May 6.

Michigan Central, annual, Detroit, Mich., May 6.

Missouri, Kansas & Texas, annual, Parsons, Kan., May 19.

New York, Chicago & St. Louis, annual, Cleveland, O., May 5.

New York & Harlem, annual, Grand Central Depot, New York City, May 18, and special meeting at the same time and place.

Northern (New Hampshire), annual, Concord, N. H., May 27.

Philadelphia & Reading, annual, Twelfth and Market streets, Philadelphia, May 3.

Union Pacific, annual, Boston, Mass., April 28.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *National Convention of Railroad Commissioners* will be held at St. Louis, Mo., on May 11, 1897.

The *Association of American Railway Accounting Officers* will hold a convention at Richmond, Va., on May 26, 1897.

The *Association of Railroad Claim Agents* will hold their next meeting at the Southern Hotel, St. Louis, May 26, 1897.

The *Association of Railway Claim Agents* will hold its convention at St. Louis, Mo., during the last week of May, 1897.

The *Canadian Electrical Association* will hold its convention at Niagara Falls, Ont., June 2, 3 and 4. The sessions of the convention will be held in the Assembly

Hall of the Dufferin Café, in Queen Victoria Park, where the annual association banquet will also be given on the evening of the second day. Hotel Lafayette will be the headquarters of the association.

The *Master Car Builders' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 8, 1897.

The *National Association of Local Freight Agents' Associations* will hold a convention at Washington, D. C., on June 8, 1897.

The *American Railway Master Mechanics' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 15, 1897.

The *National Association of Car Service Managers* will hold a convention at Boston, Mass., on June 16, 1897.

The *Association of Railway Telegraph Superintendents* will hold a convention at Niagara Falls, N. Y., on June 16, 1897.

The *Train Despatchers' Association of America* will hold a convention at Detroit, Mich., on June 22, 1897.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds its formal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 25 East Eighth street, Cincinnati, O., on the third Thursday in each month, at 7:30 p. m. Address P. O. Box 333.

The *Engineers' Club of Columbus, (O.)* meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago.

The *St. Louis Railway Club* holds its regular meeting on the second Friday of each month, at 3 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736-1738 Monadnock Block, Chicago.

Civil Engineers' Club of Cleveland.

The April meeting of the Civil Engineers' Club of Cleveland was held at the Electricity Building, Case School of Applied Science, on Tuesday evening, April 13. Dr. Cady Staley, President of the Case School of Applied Science, gave an address on the "Arch in Architecture," illustrating the subject with lantern views.

Air-Brakemen's Association.

The National Association of Air-Brakemen met at Nashville, April 14 and 15. The proposition of the Traveling Engineers' Association, that meetings of the two organizations be held together hereafter, was accepted. Baltimore was selected as the next place of meeting. The association elected the following officers: President, M. F. McKee, St. Paul, Minn.; Secretary, F. M. Kilroy, Pine Bluff, Ark.; Treasurer, Otto Best, Nashville.

Canadian Society of Civil Engineers.

A regular meeting of the Canadian Society of Civil Engineers was held at the rooms of the Society in Montreal on Thursday, April 22. Abstracts of the following articles were read by the members of the Committee: "Comparative Tests of Steam Boilers with Different Kinds of Coal," "Paint as a Protection for Iron" and "Inclined Plane Railways." A discussion was held on the paper by Mr. Atkinson entitled "A New and Cheap Method for Dressing Car Wheels, Axles, etc."

The Chicago Electrical Association.

A regular meeting of the Chicago Electrical Association was held Friday evening, April 16, at Room 1737, Monadnock Building, Chicago. Mr. C. Wiler, of the Western Electric Co., presented a paper on "Arc Lighting in America and Europe," which was discussed by Mr. W. K. Howe. Various items of current interest were brought to the attention of the association by Mr. W. Clyde Jones. At the next meeting, on May 7, Mr. C. H. Thordarson will read a paper on "Direct Current Transformers."

Franklin Institute.

At the next meeting of the electrical section of the Franklin Institute, of Philadelphia, Pa., which will be held Tuesday evening, April 27, at 8 p. m., H. Lyman Sayen will exhibit and describe his "New Form of Crookes Tube, with Automatically Adjustable Vacuum; also Some New Forms of X-Ray Apparatus." Papers will be read by F. H. Lincoln on "Emergency Engineering," following the recent fire at the power station (Thirteenth and Mt. Vernon streets) of the Union Traction Co., and C. J. Toerring on "The Enclosed Arc."

Engineer's Club of St. Louis.

A regular meeting of the Engineers' Club of St. Louis was held on April 7 at 8 p. m. The discussion of the evening was on "The St. Louis Tornado." Mr. Julius Baier presented a number of stereopticon views showing the destructive action of the wind in St. Louis and at the bluffs across the river. Mr. Robert Moore gave a report on "Wind Pressures" published by a commission appointed by Parliament after the fall of the Tay bridge in 1880. Mr. N. W. Eayres described the effect of the tornado on the east end of the Eads bridge and gave a theory as to the manner in which this structure failed. F. E. Nipher and M. L. Holman also took part in the discussion.

PERSONAL.

—Mr. H. E. Dunn has been appointed Traveling Passenger Agent of the Oregon Short Line.

—Mr. Edward M. Paxon has resigned as one of the Receivers of the Philadelphia & Reading.

—Mr. Alexander Robertson, Trainmaster of the Fitchburg, with headquarters at Boston, has resigned.

—Mr. Sidney Reynolds has been appointed Traveling Freight Agent of the Cincinnati, Jackson & Mackinaw.

—Mr. William Noble has been appointed Traveling Freight and Passenger Agent of the St. Louis & San Francisco.

—Mr. E. J. Martyn, a prominent Director of the Union Stock Yards Co., died of pneumonia at his home in Chicago on April 12.

—Mr. A. M. Stewart has been appointed Live Stock Agent of the Erie lines west of Buffalo and Salamanca, including Chicago.

—Mr. C. C. Spalding has been appointed Traveling Freight Agent of the St. Louis & San Francisco, with headquarters at St. Louis, Mo.

—Mr. N. I. Baird has been appointed Traveling Passenger Agent of the Toledo, St. Louis & Kansas City, with headquarters at St. Louis.

—Mr. J. D. Lipincott has been appointed General Agent of the Erie & Western Transportation Co., with headquarters at Pittsburgh, Pa.

—Mr. Arthur Pew, M. Am. Soc. C. E., was married in Auburn, Ala., on Thursday, April 15, to the daughter of Mr. and Mrs. Michael W. Harvey.

—Mr. C. C. Riley has been appointed Superintendent of Car Service of the Baltimore & Ohio Southwestern, with headquarters in Cincinnati, O.

—Mr. Thomas J. Fitzgerald, Supervisor of the Norfolk & Western, with headquarters at Shepherdstown, W. Va., died at Hagerstown, Md., April 10.

—Mr. C. E. Crane has been appointed Traveling Passenger Agent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at St. Louis, Mo.

—Mr. E. B. Ashcraft has been appointed Freight Contracting Agent for the Lake Michigan & Lake Superior Transportation Co., with headquarters in Chicago.

—Mr. C. C. W. Alfriend, Passenger Agent of the Louisville & Nashville at Louisville, Ky., died on April 13, at Ocean Springs, Miss., where he was staying on account of poor health.

—Mr. D. S. Taggart, formerly Traveling Passenger Agent of the Union Pacific, with headquarters at Salt Lake City, has been appointed Traveling Freight Agent of the Oregon Short Line. The appointment took effect April 15.

—Mr. Clark L. Pierce, who has been for several years Assistant to General Superintendent Baldwin, of the Central Vermont, has been appointed General Superintendent of the Rutland Railroad, to succeed Mr. Jesse Burdett, deceased.

—Mr. E. O. McCormick has been appointed General Passenger Agent of the Dayton & Union, with headquarters at Cincinnati, O., to succeed Mr. D. B. Martin, resigned to become Manager of Passenger Traffic of the Baltimore & Ohio.

—Mr. N. B. Hanna, of Pittsburgh, Pa., has been appointed Assistant Chief Engineer of the Atchison, Topeka & Santa Fe, with office at Newton, Kan. Mr. Hanna has been engaged in railroad building in Jamaica for the past three years.

—Mr. T. R. Foster, formerly Mechanical Engineer of the Denver & Rio Grande Railroad, died at his home in Charlestown, Mass., on April 15 of consumption, after a long illness. Mr. Foster had recently returned from Colorado, where he went some time ago in the hope of regaining his health.

—The Cleveland Car Service Association is now being managed by Mr. T. J. Charlesworth, Chairman of the Executive Committee. Mr. Simmons, the former Manager, retired on April 1. Announcement of this proposed change was made in these columns on Feb. 12, and

was contradicted by Mr. Simmons in the following issue. The Association has held two meetings to choose a new manager, but as yet has failed to reach an agreement, and another meeting will be held early in May.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—J. L. Allen has been appointed Commercial Freight Agent, with headquarters at Washington, D. C., to succeed John W. Chesley, who has been transferred to another division.

Central Pacific.—At the annual meeting of stockholders, held recently at San Francisco, the present Board of Directors was re-elected. At a subsequent meeting of the directors, on April 15, the officers of the company were re-elected.

Chicago & Grand Trunk.—At the annual meeting of the stockholders, held at Chicago on April 14, the present Board of Directors was re-elected. The directors then re-elected the following officers: President, Charles M. Hays; Secretary, Charles Percy; Treasurer, James H. Muir.

Columbus, Ohio River & Tidewater.—At a meeting of the stockholders of this projected road, held recently at Zanesville, O., the following officers were elected: President, William Kirkby; First Vice-President, S. A. Baldwin; Second Vice-President, Nathan Bickford; Third Vice-President and Treasurer, W. M. Crawford; Fourth Vice-President and General Manager, A. E. Boone; Chief Engineer, John B. Yates; Secretary, J. H. Weirick.

Delaware, Lackawanna & Western.—G. J. Gunnersbach, Eastern Passenger Agent, with office in New York City, having resigned, the duties of that office will hereafter be performed by C. L. Hackstaff, whose title has been changed to General Eastern Freight and Passenger Agent. His headquarters will be in New York City. Abraham Fell, Western Freight Manager, with headquarters at Buffalo, has resigned, and will be succeeded by W. A. Fleming, who has been acting as Mr. Fell's Assistant.

Everett & Monte Cristo.—A. B. Cherry has been appointed Master Mechanic, with headquarters at Everett, Wash., to succeed W. Irving, resigned.

International & Great Northern.—At the annual meeting of the stockholders held recently at Palestine, Tex., the following Board of Directors was re-elected: George J. Gould, Edwin Gould, Howard Gould, S. H. H. Clark, F. A. Rice, Ira H. Evans, H. B. Kane, A. Howard and R. B. Hawley. Homer Eads has been appointed General Agent at San Antonio, Tex., to succeed N. W. Grisamore, transferred to Laredo. John T. Hendricks has been appointed Commercial Agent, with headquarters at Dallas, Tex.

Kanona & Prattsburgh.—The Directors of this company, recently incorporated at Albany, are: Lewis V. P. Randolph, J. L. Suydam, William Carpenter, H. V. Post, Joseph F. McNamara, L. M. Jones, C. P. Pomeroy, of New York; J. W. Fowler, of Aiken, S. C., and W. H. Nicholas, of New York.

Lehigh & New England.—At a recent meeting of stockholders, the following Directors were elected: William J. Turner, William B. Scott, W. W. Kurtz, Simon Paelzer, John W. Moffly, Conrad Miller, W. W. Gibbs. The present officers of the company were re-elected.

Louisville, Evansville & St. Louis.—At a meeting of stockholders, held at Belleville, Ill., on April 15, the following Directors were elected: Charles S. Fairchild, James Stillman, Thomas Barrett, W. L. Bull, Mayer Lehman, O. W. Bright, of New York; George P. Heilman, Samuel Bayard, of Evansville, Ill., and Theo. G. Meier, of St. Louis.

Mexican National.—At a meeting of the Board of Directors held at New York on April 19, the following officers were elected for the ensuing year: W. G. Raoul, President; Gabriel Morton, Second Vice-President; Andrew Anderson, Jr., Secretary.

Missouri, Kansas & Eastern.—At a meeting of stockholders, held recently at St. Louis, the present Board of Directors was re-elected. The Directors then held a meeting and re-elected the following officers: President, E. C. Simmons; Secretary, George D. Dana; Treasurer, C. G. Hedge.

Missouri Pacific.—J. D. Moore, formerly Superintendent of Terminals in Kansas City, Mo., has been appointed Superintendent of the Arkansas Division of the St. Louis, Iron Mountain & Southern, to succeed John E. Rose, resigned. C. E. Carson has been appointed Superintendent of Terminals in Kansas City, to succeed Mr. Moore.

Montgomery, Hayneville & Camden.—The officers of this company, which proposes building a road from Montgomery, Ala., to Camden, are: President, Sol D. Bloch; Secretary, James T. Beck; Treasurer, John L. Cobbs; Chief Counsel, Thomas G. Jones; Chief Engineer, James T. Milner. The Directors are: H. C. Tompkins, S. Roman, W. W. McConico, E. N. Jones, L. E. Starr, James T. Beck and Sol D. Bloch.

Norfolk & Western.—Joseph H. Sands, General Manager, having resigned, the duties of that office will hereafter be performed by Vice-President J. M. Barr.

Southern.—H. I. Bettio has been appointed Auditor of Disbursements, with headquarters at Washington, D. C., to succeed J. W. Morrow, who has been transferred to other service. The appointment took effect April 20.

Wheeling & Lake Erie.—R. E. Lawrence, formerly Commercial Agent at Pittsburgh, has been appointed General Agent, with headquarters at Wheeling, W. Va. John White has been appointed Assistant Engineer.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Atlanta & Alabama.—Local newspapers report that right of way for this proposed road is now being obtained by R. M. Mitchell, President. The road is projected from Atlanta, Ga., in a general southwesterly direction through Fulton, Campbell, Coweta, Douglas and Heard counties in Georgia, and through Chambers, Clay, Tallapoosa, Elmore, Autauga and Dallas counties in Alabama, to Selma in Dallas County. It is said that the road will open up a rich agricultural district.

Augusta Terminal.—The contract for building this road has been given to A. J. Twigg, and work is to be begun at once. The road will run from a point on the Charleston & Western Carolina, along the Savannah River to Washington street, at the junction of the Southern and South Carolina & Georgia railroads, a distance

of 2½ miles. It will be built in the interest of the Union Compress Co.'s proposed plant in Augusta.

Canadian Roads.—The Provincial government of Ontario has recently passed the following railroad appropriations: Ontario & Rainy River, \$3,000 per mile for a distance not to exceed 70 miles; Montreal & Ottawa, a total of \$34,000 to build 50 miles, also the unearned subsidy of \$100,000, which was granted to the Vaudreuil & Ottawa Railroad in 1892 and in 1893 transferred to the Central Counties Railway, which now amounts to \$66,000; Manitoulin & North Shore, \$3,000 per mile for a distance not exceeding 13 miles; Tilsonburg, Lake Erie & Pacific, \$2,000 per mile for a distance not exceeding 3½ miles, from the southerly terminus of the road to Tilsonburg; Ottawa & Parry Sound, \$2,000 per mile for a distance not exceeding 10 miles, from Eganville southward toward Renfrew.

Chicago, St. Louis & Texas Air Line.—This company was organized at Austin, Tex., on April 15, with a capital stock of \$800,000, by D. G. Gunn, J. M. Nix, Frank Weinrich, E. C. Jones, D. W. Shanks, W. C. Collins, J. T. Newton, H. W. Broader and V. M. Villerman. It is proposed to build a road about 800 miles in length from Coffeyville, Kan., in a general southwesterly direction through Oklahoma and Indian territories and Texas to Brownsville, Tex., at the mouth of the Rio Grande. The road will pass through the Cherokee, Osage, Creek, Seminole and Chickasaw Nations in Indian Territory; the counties of Lincoln, Pottawatomie and Cleveland in Oklahoma Territory and through the counties of Clay, Archer, Young, Stephens, Eastland, Comanche, Brown, Mills, San Saba, Llano, Gillespie, Blanco, Kendall, Comal, Bexar, Atascosa, McMullen, Live Oak, Duval, Nueces, Hidalgo and Cameron in Texas. The principal office will be at San Antonio, Tex.

Colorado Springs & Cripple Creek.—This company was incorporated in Colorado on April 13, with a capital stock of \$100,000, by J. A. Himebaugh, Edward F. Wright, E. J. Eaton, J. B. Severy and John Campbell. It is proposed to build a road from Colorado Springs west to Cripple Creek, passing through Colorado City and Manitou, with a branch from some point on the line to Pike's Peak.

Cripple Creek District.—This company has recently been incorporated at Denver, Col., with a capital stock of \$1,750,000, by L. D. Ross, James L. Lindsay, W. T. Doubt and K. R. Babbitt. It is proposed to build a road from Victor, Col., in a general northerly direction to Gillett, passing through Cripple Creek, and also a branch to Goldfields and Independence. The principal office of the company will be in Victor.

Gaylord & Ruby Valley.—This company has been incorporated in Montana, with a capital stock of \$500,000, to build a road from Gaylord, on the Northern Pacific, in a general southerly direction up the Jefferson Valley about 25 miles to Twin Bridges, in Madison County, and thence south to a point near the Montana state line. Surveys are now being made, and it is expected that construction work will be begun before summer. A large majority of the capital stock is held by the Northern Pacific.

Long Island.—On April 19 the Senate at Albany, N. Y., passed the bill for the depression of the tracks of this road in Atlantic avenue, Brooklyn. Half the cost of this proposed work, which sum must not exceed \$1,250,000, is to be borne by the city of Brooklyn. The bill provides for the following changes in the present grade through Atlantic avenue: The grade will be depressed to Flatbush avenue, beginning at Fort Greene place and from Flatbush avenue the tracks will be run in an open cut to a point near South Elliott place. From South Elliott place to Bedford avenue a tunnel will be built and at Bedford avenue the tracks will be gradually raised in an open cut to Nostrand avenue, from which point to Ralph avenue they will be carried on a steel viaduct. From a point between Ralph and Howard avenues the grade will be again depressed and the tracks run through a tunnel and open cuts to Jardine place, at which point the grade will be again depressed to Atlantic avenue and kept it as far as Snediker avenue. Between Snediker avenue and a point at or near Atkins and Atlantic avenues the tracks will be run over another steel viaduct, and beyond Atlantic avenue the present grade of the tracks will be maintained.

Mexico, Cuernavaca & Pacific.—The concession of this road has been modified by a contract entered into between Lic. Luis Mendez on behalf of the company and General Francisco Z. Mena, Minister of Communications, on behalf of the Mexican government. By the modified concession the company must complete the line to Cuernavaca before Dec. 31 next, reach the Mescal River within two years from March 25, 1897, build a bridge over said river within six months from the expiration of the before-mentioned term of two years and complete the line to Acapulco by June 30, 1903. By the former concession the company was to complete its line to the Mescal River within 18 months from Jan. 31 next and to reach Acapulco by June 30, 1902. Another modification provides that the government shall pay the company for 15 years the sum of \$30 per year for each kilometer in operation.

Michoacan & Pacific.—It has been announced that the Zitacuaro extension will be opened on May 5. This branch, work on which was begun last winter, extends from Tuxpan, the present southern terminus of the road, south about 29 miles to Zitacuaro, passing through Zirahuato. It is expected that the new line will give an outlet for the farm products of Zitacuaro, which are principally rice, coffee and cotton. The road now extends from Maravatio, a station on the Mexican National, in a general southerly direction to Tuxpan, 63 miles.

New Roads.—A number of Colorado capitalists propose building a railroad from Hamburg, Ashley County, Ark., in a general easterly direction, about 20 miles, to some point on the St. Louis, Iron Mountain & Southern, provided the right of way and 20,000 acres of land be given by property owners of that district as a bonus. A meeting of the citizens of Hamburg was held recently and it was voted to accept the proposition. An offer of 6,000 acres of land from the citizens of Wilnot, on the St. Louis, Iron Mountain & Southern, has been made, provided the eastern terminus of the road is located at that point.

New York, Susquehanna & Western.—An extension of the Wilkes-Barre & Eastern is being built from Smithville north about 20 miles into Lackawanna County, Pa., and it is expected that grading will be completed within three months. The purpose of the extension is to open up new coal fields. John Shield, of Flemington, N. J., is the contractor in charge of the work.

Pasadena & Mt. Lowe.—This company has been incorporated in California, with a capital stock of \$600,000, by Henry Newby, A. B. Cody, J. S. Torrence, J. D. Pope, Andrew McNally and P. M. Greene. It is proposed to build and operate a road from Pasadena north about 10 miles to the top of Mt. Lowe, all in Los Angeles County.

Pensacola & Northwestern.—Bids are being asked for building 100 miles of this road in Alabama, from Repton, Conecuh County, in a general northeasterly direction through Monroe, Clarke, Marengo, Choctaw and Sumpter counties. The road is proposed to connect Pensacola, Fla., with Memphis, Tenn., a total distance of about 430 miles. Repton is the northern terminus of a branch of the Louisville & Nashville, which extends from that place south to Pensacola, via Flomaton. S. N. Van Praag, Monroeville, Ala., is President of the company.

Pickens County.—A company has recently been formed in South Carolina to build a road from Pickens, the county seat of Pickens County, in a general southeasterly direction about 10 or 12 miles to Easley or some other available point on the line of the Southern between Washington and Atlanta. Pickens has now no railroad facilities.

Southwest Texas.—This company, the notice of whose incorporation appeared in these columns on Feb. 19, proposes building a railroad in Texas from Brenham to Corpus Christi, from Corpus Christi to Brownsville and from Corpus Christi to Eagle Pass, a total distance of about 550 miles. It is now proposed to build still another line from Brownsville, which is in the extreme southeastern part of Texas, south into Mexico, passing along the Gulf coast as far as Tampico, and from that place inland to the City of Mexico, the total length of this Mexican portion to be about 480 miles. George M. Edgerton, Second Vice-President of the company, has recently returned from Mexico, where he has secured a concession for building that part of the line. He deposited \$90,000 in the Federal Treasury as a guarantee that the terms of the concession would be complied with, and it is proposed to make surveys immediately to locate that line. The road is to be built by the Manhattan Construction Co., New York. The capital stock of the railroad company is \$550,000. William Muir, 124 Warren street, New York, is President; D. Rogers, Vice-President and General Manager, and Louis J. Wortham, Secretary.

Virginia.—Grading on this road was begun at Huntington, W. Va., April 13. The road is proposed to extend from Huntington, in a generally southeasterly direction along the Guyandotte River, to some point on or near the Virginia state line. The surveys were made about two years ago, and a contract for building the first 30 miles, to the Lincoln County line, was let in January, 1896, but for some reason little or no work was done. The road is expected to open up a valuable coal and timber region in Southern West Virginia.

Electric Railroad Construction.

Albany, N. Y.—The Riverhead, Quogue & Southampton Railroad Co. has been incorporated to operate an electric road in Suffolk County between points named in title; capital, \$60,000. The Directors include Joseph Martin, J. A. MacElhiney, M. Kaskell and Morris Stamper, of New York.

Belle Vernon, Pa.—The Borough Council has granted the right of way to the Second Avenue Street Car Co. to build a line connecting Charleroi, Monongahela City, Belle Vernon and possibly Brownsville and Uniontown. The agreement specifies that the road shall be completed by July 4.

Bradford, Pa.—Work has been commenced on the extension of the Bradford electric street railroad from the present terminus in East Bradford to the city line on East Main street, where connection will be made with the Bradford-Olean electric line, which is being built.

The contract for the construction of the Braddock & Homestead Street Railroad has been awarded to Erbeck Brothers of Homestead, for a double-track road, four miles in length, connecting Braddock with Homestead over the West Braddock bridge. Melon Brothers, of Pittsburgh, are reported to be the promoters of the road.

Buffalo, N. Y.—The Buffalo, Niagara River & Grand Railway Co. was incorporated on April 11, with a capital of \$30,000, to operate an electric road in Erie County.

Corning, N. Y.—T. C. Freney, Vice-President of the Corning Construction Co., informs us that the company has no railroad work whatever under consideration.

The Savona Valley & Lake Keuka Railroad has completed specifications for the grades and bridges and will close all contracts by May 1 for its proposed line, which will cost nearly \$100,000. The power-house, will cost about \$35,000. The company proposes to use water as the motive power during nine months of the year and steam power for the three months when the traffic is heavy. The proposed road is 18 miles long and will pass from Savona through Sonora, Bradford, Wayne, Tyrone, Keuka, Gibson and Pultney. Work will be begun on the road the first week in May. The following are the newly elected officers: Charles A. Cockroft, Binghamton, President; C. C. Covert, Binghamton, Vice-President; C. A. Brown, Binghamton, Secretary and Treasurer, and James D. Nares, of Corning, General Manager.

Franklin, Pa.—The Franklin Street Railway Co. has let the contract for grading the roadbed for an extension of its line to B. De Woody, of Franklin. The ties and rails have been contracted for, and with favorable weather the work can be completed ready for the cars early in May.

Galveston, Tex.—The Galveston & Houston Electric Railway Co. has been granted a charter. The capital stock is \$150,000. Directors: A. B. Blevins, Theo. Miller, William Bradburn, W. L. Orr and others.

Jeffersonville, N. Y.—The Liberty & Jeffersonville Electric Railroad Co. has been incorporated to operate a 12-mile railroad in Sullivan County, with a capital of \$120,000. The Directors include Frank Lober, Thos. M. Loomis, New York; C. W. Wilfert and George Yager, Jeffersonville.

Lima, O.—The Lima Street Railway Co. has commenced the construction of its extension west on Kibby street to the Solar Refinery. The 500-H. P. engine is being put in position, and work has been commenced on the brick car barn.

Long Branch, N. J.—The Atlantic Highlands, Red Bank & Long Branch Electric Railway Co. has secured consent to cross all the streets between Oakwood and Second avenue north of Broadway by a double-track electric road. The road will be run over private property nearly the entire distance.

Mt. Vernon, O.—The Central Ohio Electric Railway Co. proposes to build a line from Marion to Mt. Vernon, making in all a line about 25 miles in length. Preliminary plans have been drawn, surveys have been completed and the route has been decided upon, but actual construction has not as yet been begun. Further particulars will be given later.

North East, Md.—The North East, Rising Sun & Elk River Electric Railroad Co., which was recently granted a charter, has elected the following officers: James Malen, of Conshohocken, Pa., President; George W. Cosden, of North East, Secretary and Treasurer; J. C. Carhart, of Zion, Md., Secretary. The company proposed to build an electric road from Rising Sun through North East to the Elk River. The plans have not been completed, and it may be some time before arrangements are made to build the road.

Pittsburgh, Pa.—The Pittsburgh & Mt. Washington Street Railway Co. has begun the construction of its road noted in our issues of March 12 and April 9.

The Beechwood Street Railway Co. of Pittsburgh has been incorporated, with a capital of \$15,000.

Titusville, Pa.—The survey for the electric road between Titusville and Hydetown has been completed, and the Hydetown Council has passed the ordinance granting the company a franchise.

Towanda, Pa.—The Portsmouth & Port Norfolk Electric Railroad is building an extension to Pinner's Point, a distance of about 1½ miles. The road is at present 4 miles long and has been in operation for three years. W. H. Miner, S. W. Little, both of Towanda, and O. L. Haverly, of Athens, are interested.

Westchester, Pa.—Sixty property owners have given their consent to the Philadelphia, Castle Rock & Westchester Electric Railroad to build a line in Chester County.

Woodhull, Pa.—The electric railroad between Addison and Jasper has been nearly completed.

GENERAL RAILROAD NEWS

Augusta & Summerville.—This road, which is 2½ miles long, in Augusta, Ga., has been purchased by Messrs. Thomas and Ryan, who have recently acquired certain other railroad property in North and South Carolina and Georgia. At a meeting recently held the company was reorganized, with Henry Crawford, of New York, as President. The road does a general freight transfer business between the different lines entering Augusta.

Baltimore & Ohio.—The earnings for February and for the eight months ending Feb. 28 have been reported as follows:

February:	1897.	1896.	Inc. or Dec.
Gross earn.	\$1,777,368	\$1,538,005	I. \$239,363
Oper. expen.	1,489,642	1,298,609	I. 191,033
Net earn.	\$287,726	\$239,396	I. \$48,330
Eight months:			
Gross earn.	\$17,241,561	\$16,088,953	I. \$1,152,608
Oper. expen.	13,277,741	11,331,469	I. 1,946,272
Net earn.	\$3,963,820	\$4,757,484	D. \$793,664

The suit against the receivers to compel them to continue the payment of the annual dividend of six per cent. on the \$3,000,000 first preferred stock issued by the company was tried in Baltimore, in the United States Court, on April 21. The suit was brought on the ground that the stock is a first lien on the property and franchises of the road, and that under the terms of the issue the dividend should be paid out of the gross profits. The semi-annual dividend was passed by the receivers July 1, 1896. The receivers claim that holders of the preferred stock are only entitled to receive a dividend when the road is able to declare a dividend of six per cent. upon the par value of profits of any fiscal year. No such profits accrued during the half-year from Jan. 1 to June 30, 1896, it is claimed, which could be distributed as a dividend to the preferred stockholders without prejudice to the lawful rights of creditors of the company. The receivers contend that no dividend may be paid until all the company's creditors have been paid. For the first six months of 1896, it is stated, the operations of the road showed a deficit of \$1,368,438.

Carolina, Tennessee & Ohio.—Judge Melver, of the State Superior Court, at Wilmington, N. C., has ordered the sale of the road which is proposed to connect Wilmington with Southport, about 30 miles, and was partly completed last year by the Union Construction Co. It is now in the hands of J. T. Adams, who was appointed Receiver several months ago. The sale has been fixed for May 15 next, at Southport. A company will probably be formed to purchase and complete the road to Southport.

Central of New Jersey.—On April 15 the Committee on Corporations in the Pennsylvania Senate at Harrisburg declined to recommend the appointment of a special committee to investigate the relations between this company and the Lehigh & Wilkes Barre Coal Co., as provided in a resolution offered in the Senate on April 6. A brief of the resolution was given in these columns last week.

Chicago, Lake Shore & Eastern.—A trust deed for \$1,300,000 was filed for record at Chicago on April 15 with County Recorder Simon to the Merchants' Loan & Trust Co., of New York. The deed is given in consideration of the issue of 1,200 bonds of the denomination of \$1,000, bearing 5 per cent. interest and payable in gold. The bonds form a first lien on the property of the company.

Cleveland, Canton & Southern.—The International Trust Co., of Boston, has filed a cross bill in the United States Court at Columbus, O., against this company the Cleveland & Canton, the Waynesburg & Canton and the Chagrin Falls & Northern, to foreclose certain mortgages for which the trust company is trustee. The railroads named are now in the hands of John W. Wardwell, of Cleveland, O., Receiver. A full accounting of the funds in the hands of the Receiver, as well as the foreclosure of the mortgages, is asked for in the bill.

Nashville, Chattanooga & St. Louis.—On April 14 J. S. Rogers filed in the Federal Court at Nashville, Tenn., an amended bill in the case now pending which was brought by him some months ago to restrain this company from perfecting the lease of the Tennessee Midland and the Paducah, Tennessee & Alabama made with the Louisville & Nashville Jan. 1, 1896. A brief account of the first application made by Mr. Rogers was given in these columns on Feb. 5. Mr. Rogers now alleges that the Louisville & Nashville has obtained control of this road and has forced it to enter into the lease. He has filed the bill on his own behalf and on behalf of all other stockholders who desire to become parties. He asks

that the Louisville & Nashville be enjoined from voting the stock of this company, which it owns and that this company be enjoined from operating the leased roads in question.

Philadelphia & Reading.—The earnings for February and for the three months ending Feb. 28 were as follows:

February:	1897.	1896.	Inc. or Dec.
Gross earn.	\$1,473,328	\$1,351,306	I. \$122,022
Oper. expen.	851,815	826,227	I. 25,588
Net earn.	\$621,513	\$524,079	I. \$97,434
Three months:			
Gross earn.	\$1,657,790	\$1,909,015	D. \$251,225
Oper. expen.	2,346,186	2,773,451	D. 27,265
Net earn.	\$2,111,694	\$2,135,564	D. \$23,960

Pittsburgh, Cincinnati, Chicago & St. Louis.—The earnings for March and for the three months ending March 31 have been reported as follows:

March:	1897.	1896.	Inc. or Dec.
Gross earn.	\$1,136,233	\$1,210,283	D. \$74,050
Oper. expen.	1,010,462	1,094,148	D. 83,686
Net earn.	\$116,171	\$116,135	I. \$36
Charges and rentals.	264,721	273,716	D. 9,995
Deficit.	\$138,050	\$157,571	D. \$20,611
Three months:			
Gross earn.	\$3,289,926	\$3,621,055	D. \$331,129
Oper. expen.	2,624,505	2,981,745	D. 357,240
Net earn.	\$665,421	\$639,310	I. \$26,111
Charges and rentals.	799,998	825,578	D. 25,580
Deficit.	\$134,577	\$183,268	D. \$48,691

Union Pacific.—The earnings of the entire system for February and for the two months ending Feb. 28 have been reported as follows:

February:	1897.	1896.	Inc. or Dec.
Gross earn.	\$1,685,877	\$1,501,333	I. \$184,544
Oper. expen.	1,067,473	975,946	I. 91,527
Net earn.	\$618,404	\$525,387	I. \$93,017
Two months:			
Gross earn.	\$3,268,440	\$3,046,962	I. \$221,478
Oper. expen.	2,152,182	2,098,635	I. 53,547
Net earn.	\$1,216,258	\$948,327	I. \$267,931

Utah Central.—The sale of this road, which had been ordered by Judge Hiles to take place on April 17, has been postponed in consequence of a request of the Eastern bondholders. Special Master Loomis has re-advised the sale to take place on May 8, his action being approved by the court.

Wilmington & Northern.—The directors of the company have recently issued and sold \$70,000 of 5 per cent. gold car trust bonds to Scott & Co., bankers, of Wilmington, Del. The bonds mature in November, 1906, and were issued in connection with the order for 200 gondola cars referred to in another column.

Electric Railroad News.

Brooklyn.—The reports of the Brooklyn Heights R. R. Co. and the Brooklyn, Queens County & Suburban R. R. Co., of the Brooklyn Rapid Transit Co., for the quarter ending March 31, 1897, show the following figures:

Brooklyn Heights:	1897.	1896.	Inc. or Dec.
Gross earn. from operation.	\$359,63	\$946, 53	I. \$13,450
Oper. expen. (ex. taxes).	644,947	635,381	I. 9,566
Net earn. from operation.	\$314,756	\$310,872	I. \$3,884
Income (other sources).	59,416	57,358	I. 2,058
Gross income (all sources).	\$374,182	\$368,230	I. \$5,958
Fixed charges and taxes.	449,343	497,211	D. 47,838
Net income (all sources), deficit.	\$75,161	\$128,381	D. \$53,220

Oper. cost, per cent. of earn. (ex. taxes).	67.20	67.13	I. .07
Oper. cost, per cent. of earn. (inc. taxes).	68.81	71.60	D. 5.79

Brooklyn, Queens County & Suburban:

	1897.	1896.	Inc.
Gross earn. from operation.	\$154,927	\$144,966	\$10,021
Oper. expen. (ex. taxes).	107,419	98,724	8,698
Net earn from operation.	\$47,508	\$46,185	\$1,322
Income (other sources).	2,342	1,750	592
Gross income (all sources).	\$49,850	\$47,935	\$1,915
Fixed charges and taxes.	90,302	88,159	2,143
Net income (all sources), deficit.	\$40,452	\$40,224	\$228
Oper. cost p. c. of earn. (ex. taxes).	65.07	68.13	.94
Oper. cost p. c. of earn. (inc. taxes).	73.53	72.23	1.30

Columbus, O.—The Equitable Trust Co., of Chicago, has filed a cross-petition in the United States Court, in the suit of Reinhardt Scheidler vs. the Newark & Granville Electric Railway Co., asking for a Receiver.

Cortland, N. Y.—The Cortland & Homer Railroad Co., formerly the Cortland & Homer Horse Railroad Co., has transferred to the Cortland & Homer Traction Co. its capital stock. The latter company has held the property and franchises of the former company under lease since June 28, 1894.

Kansas City, Mo.—The West Side Street Railway Co., of Kansas City, has filed a statement of increase of capital stock from \$20,000 to \$100,000.

Montreal, Que.—At the last meeting of the directors of the Montreal Street Railway Co. it was decided to issue immediately \$500,000 of new stock, instead of \$1,000,000, as permitted by the shareholders.

New York.—The following figures show the amounts paid to the city last year by the Metropolitan Traction Co. and the Third Avenue Railroad Co.:

	Metropolitan Co.	Third Avenue Co.
Percentage of receipts.	\$13,161.93	.....
Fixed rental.	150,000.00	.....
Car license.	40,280.00	.....
Personal tax.	39,114.27	\$5,482.80
Tax on real estate.	112,607.20	48,867.00
Track taxes.	54,489.75	11,701.90
Totals.	\$439,592.25	\$69,051.70

Philadelphia.—A special meeting of the stockholders of the East Pennsylvania Traction Co. has been called for May 17, to take action on the proposed increase in the

capital stock from \$650,000 to \$1,000,800. The bond issue will amount to \$1,000,000 if the increase is made.

TRAFFIC.

Traffic Notes.

Water will be let into the Erie Canal on May 1 and it is expected to open the canal for traffic by May 5, though the improvement work now going on may possibly cause a little delay.

The Kansas City, Pittsburgh & Gulf has made an arrangement with the Mallory Steamship Company, for through freight rates between Kansas City and New York, New England and Atlantic Coast points, by way of the International & Great Northern.

The City of Spokane has been beaten in its suit before the United States Court to compel a reduction of freight rates over the Northern Pacific from the east, to a level with rates over the same road through to the Pacific coast. The latter were made lower than rates to interior points, in order to meet the competition of vessels via Panama and around Cape Horn, and so it comes about that freight for places between Spokane and the coast may go over the road to the western terminus and back again over the same line. The suit was begun more than two years ago, and testimony was taken last summer. The Special Master, L. S. H. Sawyer, has just made his report, holding that the rates to Spokane are not unreasonable in themselves, that the water competition actually exists; that a reduction as desired by the merchants of Spokane would unnecessarily deprive the railroad company of revenue and that an advance of rates to the coast would be of no benefit to places in the interior. The Interstate Commerce Commission had issued an order in the premises which it was claimed was being disobeyed, but the Master finds that no such violation has been established. The attorney for the merchants will probably ask for a re-hearing or take an appeal.

Chicago Traffic Matters.

CHICAGO, April 21, 1897.

The proposed new passenger agreement of the Western roads will probably be adopted to-morrow. In wording it is much like the old one. There are some omissions and the chairman's duties are changed in some respects. The object of the agreement is stated to be protection against illegal competition, and to provide for proper action on all matters of common interest. While no effort has been made to restrain the individual action of roads it has been provided that each line must give ample notice to every other line of its intentions concerning rates. The name of the organization will remain unchanged, it having been decided to drop the long-drawn out name of the Western Bureau of Information and Statistics. The most important clauses of the agreement are the following:

SECTION 1. Parties hereto shall file with the chairman all rate sheets, circulars, rules or regulations affecting passenger traffic which they may issue, and the chairman shall take such action as agent of each individual line in disseminating such information concerning passenger traffic as may be necessary.

Sec. 2. The chairman shall act for all members in compiling and publishing joint rate sheets, and shall file for the individual lines with the Interstate Commerce Commission all rates necessary under the law.

Sec. 3. Whenever it is necessary to make a change in any rate, rule or regulation affecting passenger traffic immediate notice of such change shall be filed with the chairman in ample time to enable him to make announcement thereof to all lines in interest.

Sec. 4. Nothing herein shall be construed as preventing any line from taking individual action in changing passenger rates of fare, immediate and sufficient notice being given to the chairman in advance in order that he may publish or advise such rates of fare.

Sec. 5. In compiling or publishing joint rate sheets where rates of individual lines differ, the publication of sheets shall not be delayed, but the rates of individual lines shall be shown therein as advised to the chairman.

The Western general passenger agents have suggested to General Passenger Agent Goodman of the Southern Pacific that it will not be possible to carry out the original idea of a division of traffic to the Christian Endeavor Convention, and that unless restrictive measures are taken the rates will be demoralized; and that round-trip rates could not be maintained, as they would afford an opportunity for manipulation. Therefore they suggest that a one-way rate of \$25 be made from Chicago to San Francisco, and that selling dates be arranged on three or four days acceptable to the Christian Endeavor officials. Then the California lines could arrange selling dates returning.

The managers of the Joint Traffic Association by making a lake and rail rate of 10 cents on wheat from Chicago and Milwaukee to New England points, have materially benefited Chicago grain interests. Navigation is now practically open, although few of the grain carrying boats have so far set sail for the East. Last week's lake shipments of grain amounted to 122,977 tons as compared to 3,519 tons the preceding week. Vessel men, however, are not very hopeful and declare that they expect a fierce struggle for existence.

It is freely asserted that Western freight rates are in a demoralized state. It is alleged that in the territory east of the Mississippi River high-class rates are cut from 30 to 50 per cent. and low-class from 10 to 33½ per cent. Commissions of \$2 to \$10 per car to parties able to control the routing of freight are being paid and all kinds of switching, transfers and other terminal charges are being absorbed. It is impossible to say how much basis of truth exists to support these rumors.

Eastbound shipments from Chicago and Chicago Junctions to points at and beyond the Western termini of the trunk lines for the week ending April 15 amounted to 79,854 tons, as compared with 85,069 tons the preceding week. This statement includes 32,437 tons of grain, 8,811 tons of flour and 9,276 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	WEEK ENDING APRIL 5.		WEEK ENDING APRIL 8.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio.	4,706	5.9	5,273	6.2
C. & C. & St. Louis.	4,831	6.0	3,689	6.7
Erie.	9,055	11.3	9,352	11.0
Grand Trunk.	5,385	6.7	5,952	7.0
L. S. & M. S.	10,056	12.6	8,254	9.7
Michigan Central.	17,620	22.1	22,535	26.5
N. Y., Chl. & St. L.	6,668	8.4	6,553	7.7
Pitts., Cin. & St. Louis.	8,545	10.7	7,073	8.3
Pitts., Ft. Wayne & Chicago	7,811	9.8	8,879	10.4
Wabash.	5,177	6.5	5,509	6.5
Totals.	79,854	100.0	85,069	100.0